APPENDIX C

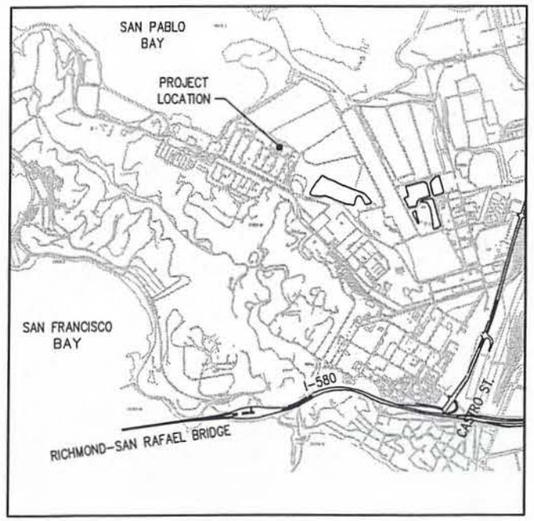
AS-BUILT DRAWINGS OF THE LANDFARM DRIP IRRIGATION PLANS AND VEGETATION PLANS

Chevron

RICHMOND REFINERY
RICHMOND, CALIFORNIA

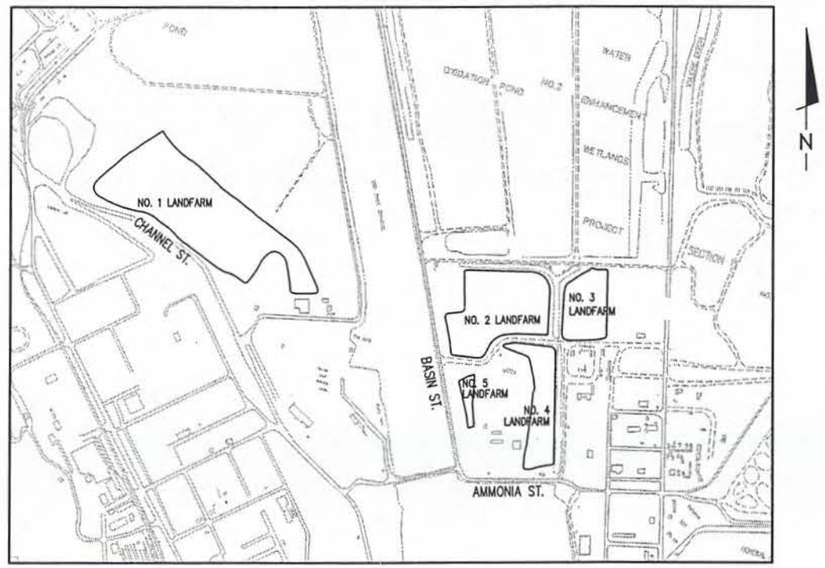
WASTE DISCHARGE ORDER PROJECT

DRIP IRRIGATION SYSTEM
LANDFARMS CLOSURE PLAN
NOS. 1 THROUGH 5 LANDFARMS



LOCATION MAP

0 2000
Scale in Feet



VICINITY MAP

0 500
Scale in Feet

DWG. NO.	TITLE
D-767533	NO. 1 LANDFARM – DRIP IRRIGATION PLAN
D-767534	NO. 2 THROUGH 5 LANDFARMS – DRIP IRRIGATION PLAN
D-767535	DRIP IRRIGATION SYSTEM DETAILS

GENERAL NOTES

1. COORDINATES SHOWN ARE BASED ON 1983 NORTH AMERICAN DATUM (N.A.D.) COORDINATE SYSTEM.

2. ELEVATIONS SHOWN ARE BASED ON RICHMOND REFINERY DATUM. ELEVATION 0.00' EQUALS ELEVATION –2.17' NATIONAL GEODETIC VERTICAL DATUM (NGVD).

3. ALL CONSTRUCTION SHALL CONFORM TO THESE PLANS AND SPECIFICATIONS.

4. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING UTILITIES AS SHOWN ON THESE DRAWINGS ARE FROM THE BEST INFORMATION AVAILABLE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF THE DELINEATION OF SAID UTILITIES NOR FOR THE EXISTENCE OF OTHER BURIED OBJECTS OR UTILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.

5. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING STRUCTURES, UTILITIES, AND FACILITIES. ANY DAMAGE TO EXISTING FACILITIES BY THE CONTRACTOR OR HIS SUBCONTRACTORS SHALL BE RESTORED (TO AN EQUAL OR BETTER CONDITION) OR REPLACED (TO AN EQUAL OR BETTER CONDITION) AT NO COST TO THE COMPANY.

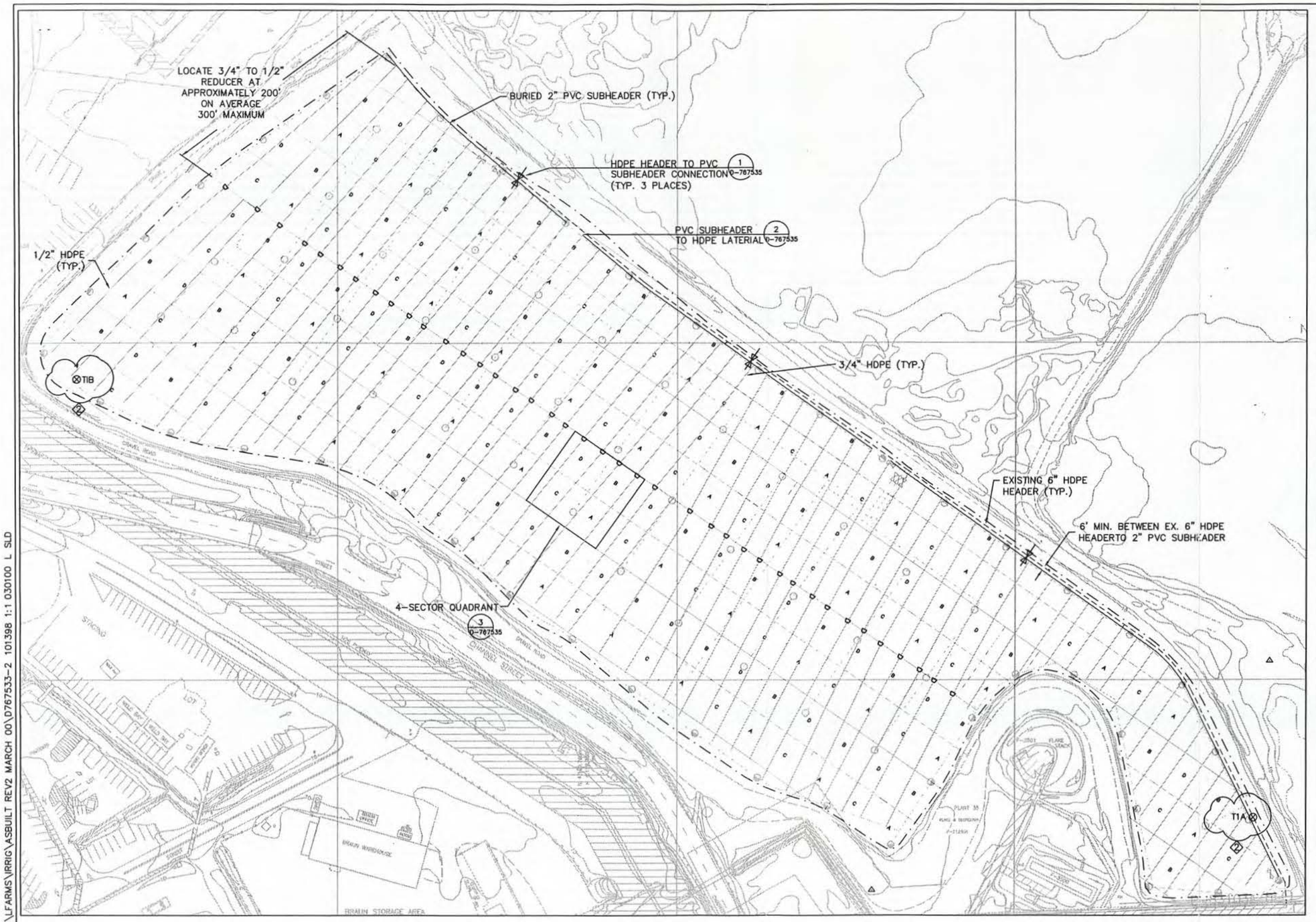
6. THE CONTRACTOR IS RESPONSIBLE FOR ALL EROSION CONTROL REQUIREMENTS. CONTRACTOR SHALL IMPLEMENT ANY NECESSARY BEST MANAGEMENT PRACTICES AS OUTLINED IN THE PROJECT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER.

AS-BUILT
SEPTEMBER 1999

DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
SAN FRANCISCO, CA.

REGISTERED PROFESSIONAL ENGINEER
THOMAS M. SNEET
No. C 58265
EXP.
CIVIL
STATE OF CALIFORNIA

42100001 \CHEV-R\S83\LFARM\IRRIG\ASBUILT\ COVER 032299 1:1 B30200 SLD



NOTES:

1. ORIENTATION OF PLANTING TO CONTROL PLACEMENT OF DRIP SYSTEM EMITTERS.
2. ALL SUBHEADER/LATERAL CONNECTIONS TO BE 90° (OTHERS SHOWN TO SIMPLIFY DRAWING).
3. VALVES, FITTING, AND LINE LOCATIONS SHOWN ARE APPROXIMATE. FINAL LOCATIONS TO BE SET IN FIELD BASED UPON FIELD CONDITIONS.
4. LOCATIONS OF 4-SECTOR QUADRANTS ARE APPROXIMATE.

LEGEND

- EXISTING OR PLANNED GPS EXTRACTION TRENCH
- EDGE OF LANDFARM
- EXISTING TURF IRRIGATION HEADER
- EXISTING TURF IRRIGATION PIPE
- 2" BURIED PVC SUBHEADER
- 3/4" HDPE DRIP IRRIGATION PIPE
- 1/2" HDPE DRIP IRRIGATION PIPE
- 6" HDPE HEADER TO 2" PVC SUBHEADER CONNECTION
- 3/4" TO 1/2" HDPE REDUCER
- ⊗T1 TENSIOMETER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. [illegible] C 50205 EXP. 6/02 CIVIL STATE OF CALIFORNIA

N

0 60
Scale In Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

0 ISSUE CONSTRUCTION 12/98	CIK	2 ADD TENSIOMETERS T1A AND T1B 3/01/00	SLD
1 AS-BUILT 9/15/99	CIK		

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE 10/98
ENGR. ENGR. DEPT.
OPR'G. DEPT.
APPROVED

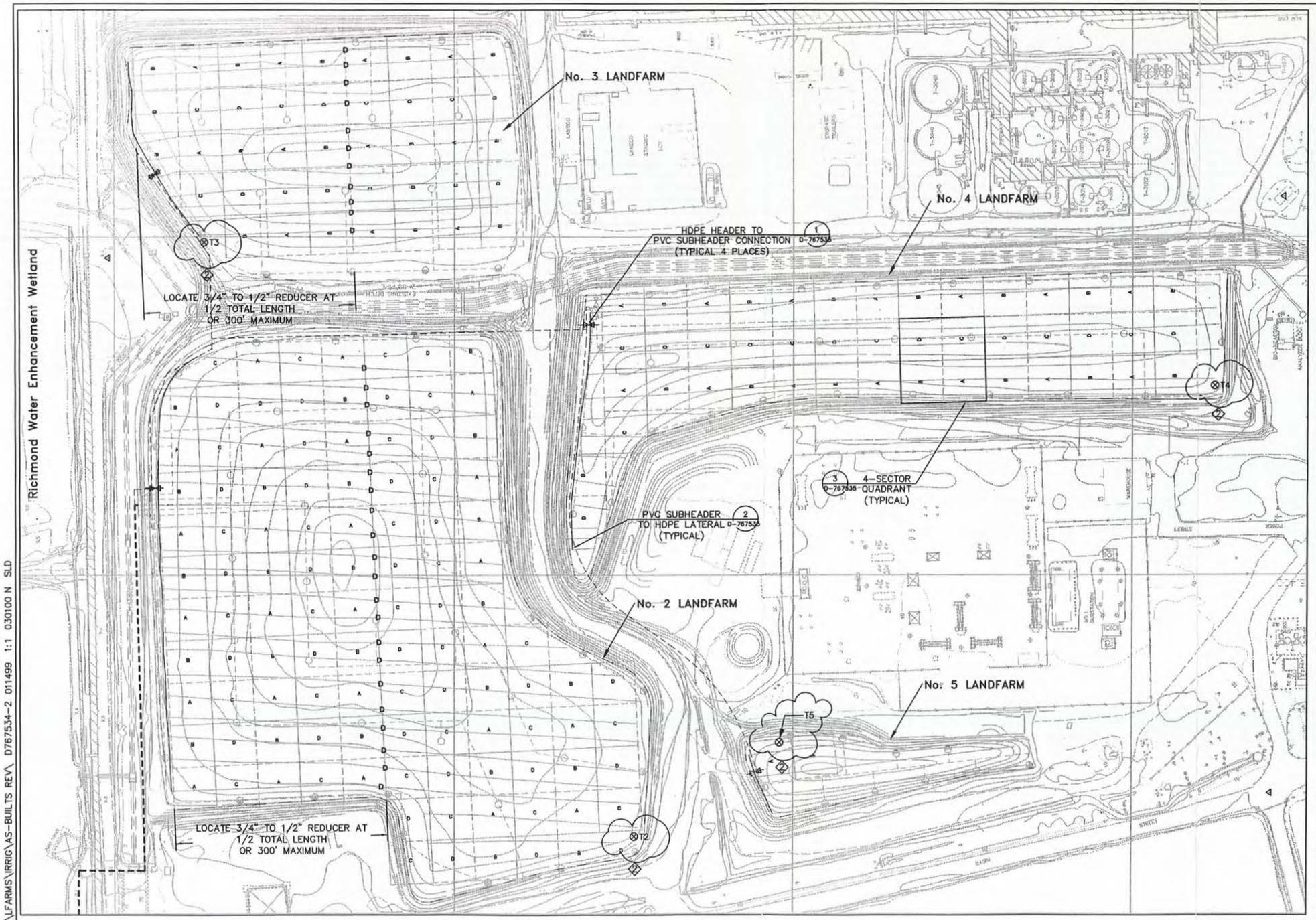
030100.SLD

NO. 1 LANDFARM - DRIP IRRIGATION PLAN
SECTOR 83: LANDFARMS/LANDFILLS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767533-2

42100001 \CHEV_R\S83\LFARMS\IRRIG\ASBUILT REV2 MARCH 00\D767533-2 101398 1:1 030100 L SLD



NOTES:

1. ORIENTATION AND LOCATIONS OF EXISTING PLANTS TO CONTROL PLACEMENT OF DRIP SYSTEM EMITTERS.

2. ALL SUBHEADER/LATERAL CONNECTIONS TO BE 90° (OTHERS SHOWN TO SIMPLIFY DRAWING).

3. VALVES, FITTINGS, AND LINE LOCATIONS SHOWN ARE APPROXIMATE. FINAL LOCATIONS TO BE SET IN FIELD BASED UPON ACTUAL FIELD CONDITIONS.

4. LOCATIONS OF 4-SECTOR QUADRANT ARE APPROXIMATE.

LEGEND

- EDGE OF LANDFARM
- EXISTING TURF IRRIGATION HEADER
- EXISTING TURF IRRIGATION PIPE
- 2" BURIED PVC SUBHEADER
- 3/4" HDPE DRIP IRRIGATION PIPE
- 1/2" HDPE DRIP IRRIGATION PIPE
- 6" HDPE HEADER TO 2" PVC SUB HEADER CONNECTION
- 3/4" TO 1/2" HDPE REDUCER
- ⊗T1 TENSIOMETER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. GRANT No. C 56876 EXP. 6/30/2 CIVIL STATE OF CALIFORNIA

N

0 60
Scale in Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

0	ISSUE FOR CONSTRUCTION OF NO. 2-5 LANDFARMS 3/12/99	CIK			2	ADD TENSIOMETERS T2, T3, T4 AND T5 3/01/00	SLD		
1	AS-BUILT 9/15/99	CIK							

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE JAN. 1999 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

030100, SLD

NO. 2 THROUGH 5 LANDFARMS-DRIP IRRIGATION PLAN
SECTOR 83: LANDFARMS/LANDFILLS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767534-2

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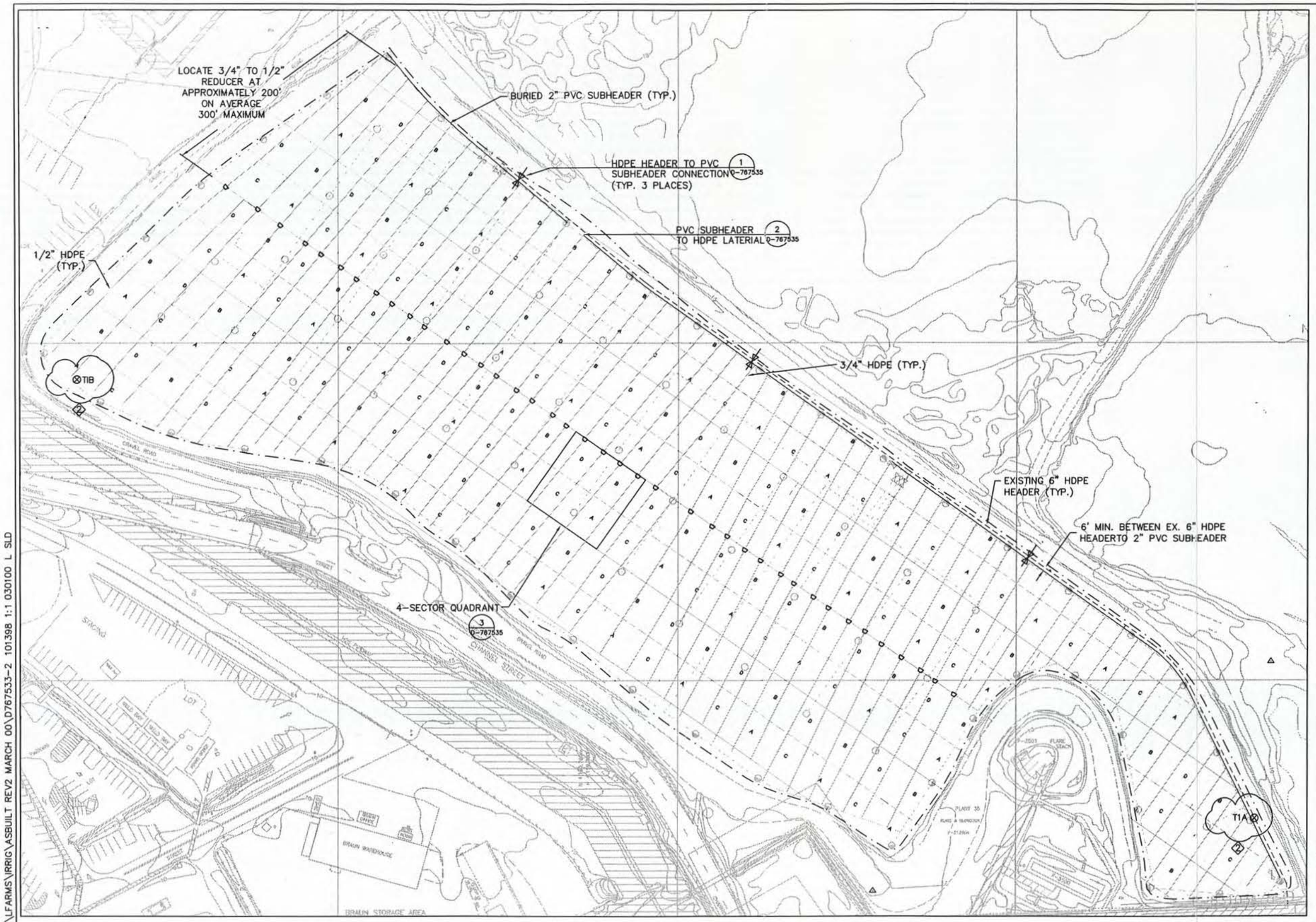

NOTES:

1. ORIENTATION OF PLANTING TO CONTROL PLACEMENT OF DRIP SYSTEM EMITTERS.
2. ALL SUBHEADER/LATERAL CONNECTIONS TO BE 90° (OTHERS SHOWN TO SIMPLIFY DRAWING).
3. VALVES, FITTING, AND LINE LOCATIONS SHOWN ARE APPROXIMATE. FINAL LOCATIONS TO BE SET IN FIELD BASED UPON FIELD CONDITIONS.
4. LOCATIONS OF 4-SECTOR QUADRANTS ARE APPROXIMATE.

LEGEND

- EXISTING OR PLANNED GPS EXTRACTION TRENCH
- EDGE OF LANDFARM
- EXISTING TURF IRRIGATION HEADER
- EXISTING TURF IRRIGATION PIPE
- 2" BURIED PVC SUBHEADER
- 3/4" HDPE DRIP IRRIGATION PIPE
- 1/2" HDPE DRIP IRRIGATION PIPE
- 6" HDPE HEADER TO 2" PVC SUBHEADER CONNECTION
- 3/4" TO 1/2" HDPE REDUCER
- ⊗T1 TENSIOMETER LOCATION

N

0 60
Scale in Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

0	ISSUE CONSTRUCTION 12/98	CIK	
1	AS-BUILT 9/15/99	CIK	
2	ADD TENSIOMETERS T1A AND T1B 3/01/00	SLD	

Chevron
Richmond Refinery

030100.SLD

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ENGR. ENGR. DEPT.
OPR'G. DEPT.

NO. 1 LANDFARM – DRIP IRRIGATION PLAN
SECTOR 83: LANDFARMS/LANDFILLS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767533-2

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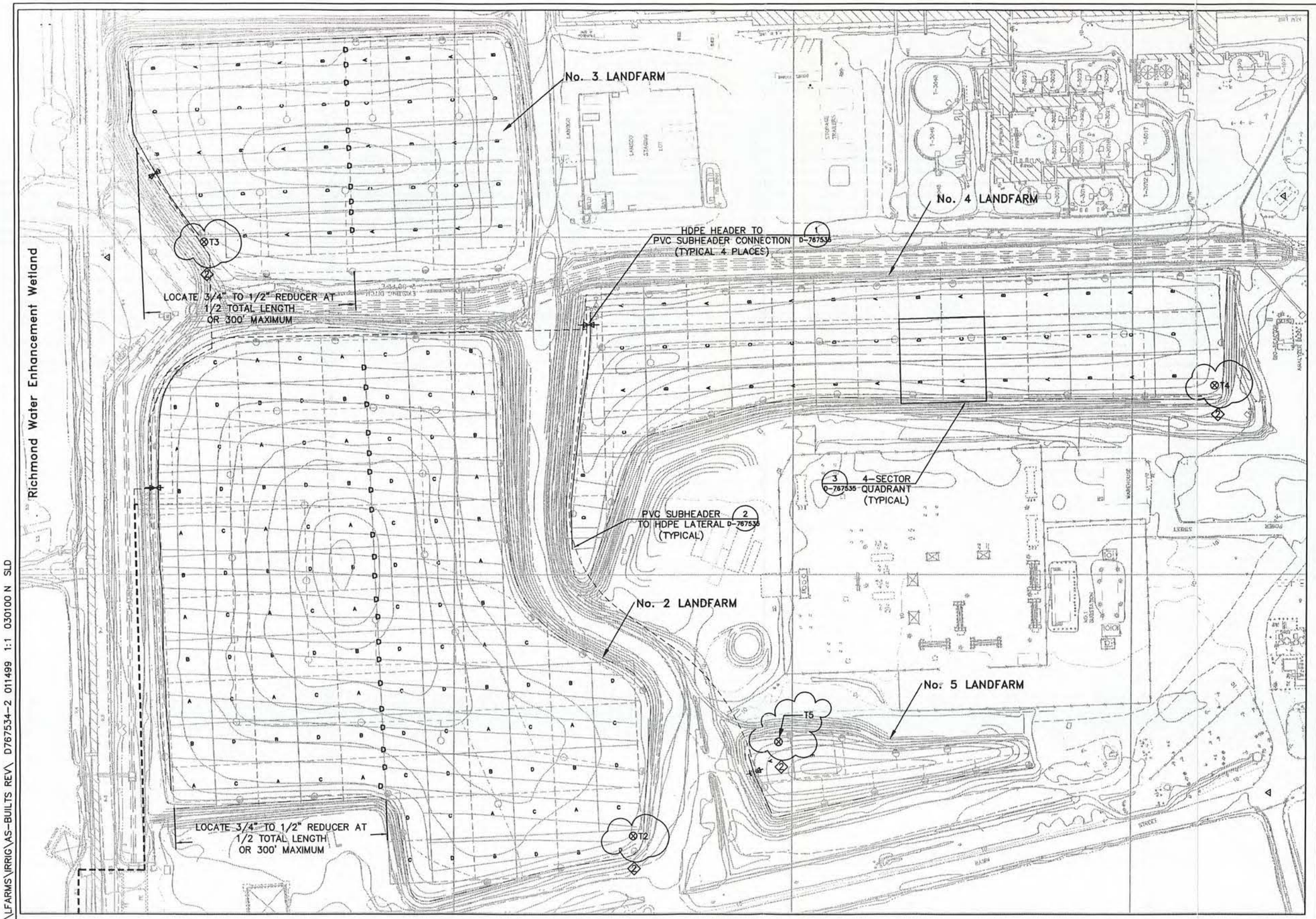

NOTES:

1. ORIENTATION AND LOCATIONS OF EXISTING PLANTS TO CONTROL PLACEMENT OF DRIP SYSTEM EMITTERS.

2. ALL SUBHEADER/LATERAL CONNECTIONS TO BE 90° (OTHERS SHOWN TO SIMPLIFY DRAWING).

3. VALVES, FITTINGS, AND LINE LOCATIONS SHOWN ARE APPROXIMATE. FINAL LOCATIONS TO BE SET IN FIELD BASED UPON ACTUAL FIELD CONDITIONS.

4. LOCATIONS OF 4-SECTOR QUADRANT ARE APPROXIMATE.

LEGEND

- EDGE OF LANDFARM
- EXISTING TURF IRRIGATION HEADER
- EXISTING TURF IRRIGATION PIPE
- 2" BURIED PVC SUBHEADER
- 3/4" HDPE DRIP IRRIGATION PIPE
- 1/2" HDPE DRIP IRRIGATION PIPE
- 6" HDPE HEADER TO 2" PVC SUB HEADER CONNECTION
- 3/4" TO 1/2" HDPE REDUCER
- ⊗T1 TENSIOMETER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. GRIFFIN No. C 6[illegible] EXP. 6/[illegible] CIVIL STATE OF CALIFORNIA

N

0 60
Scale In Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

0	ISSUE FOR CONSTRUCTION OF NO. 2-5 LANDFARMS 3/12/99	CIK	
1	AS-BUILT 9/15/99	CIK	
2	ADD TENSIOMETERS T2, T3, T4 AND T5 3/01/00	SLD	

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE JAN. 1999 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

030100, SLD

NO. 2 THROUGH 5 LANDFARMS-DRIP IRRIGATION PLAN
SECTOR 83: LANDFARMS/LANDFILLS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767534-2

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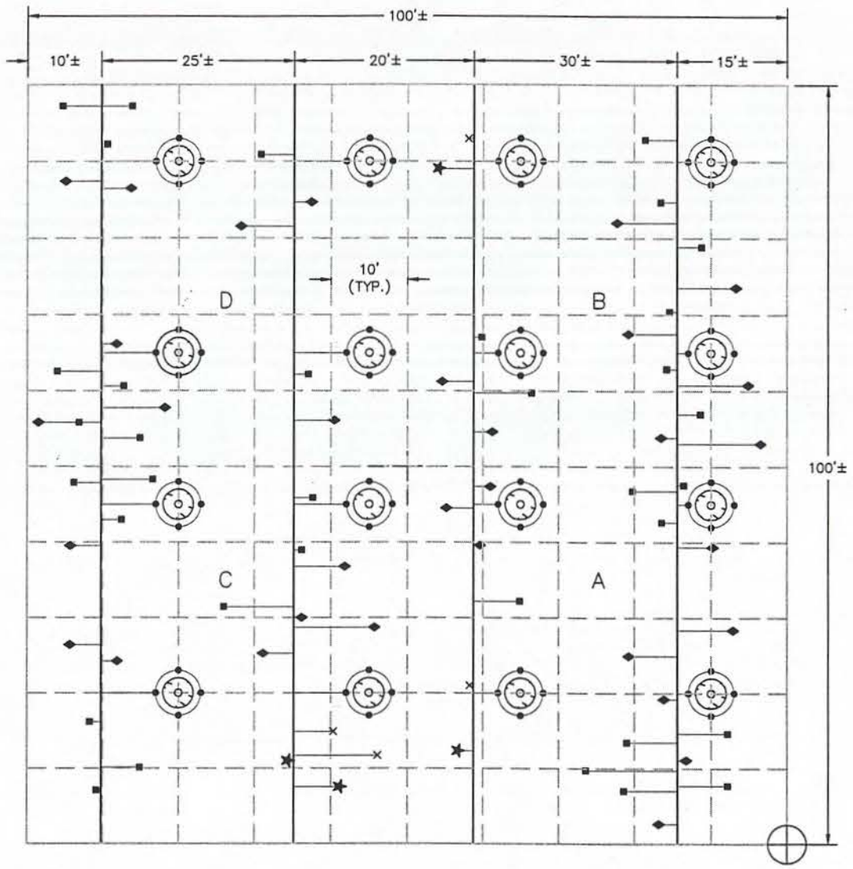
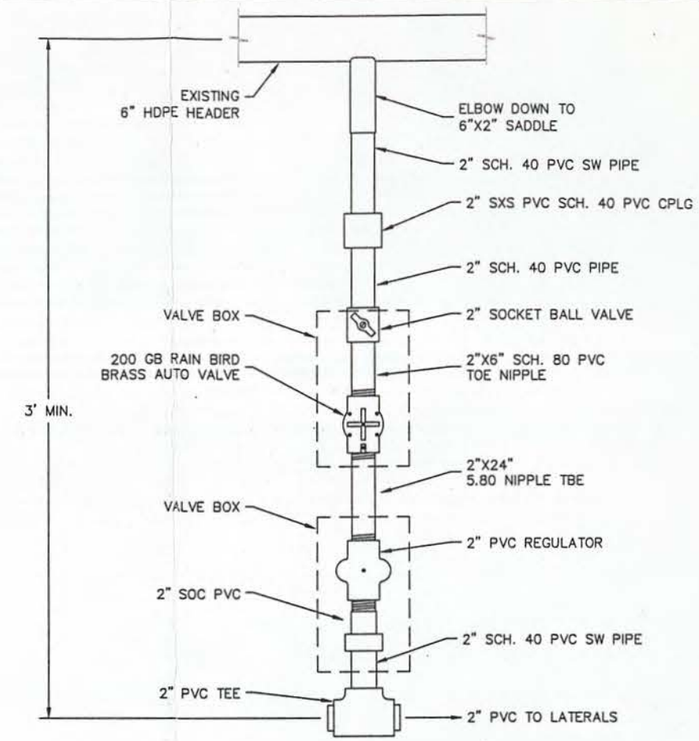


TYPICAL DETAIL 3/D-767533 3/D-767534
FOUR SECTOR QUADRANT

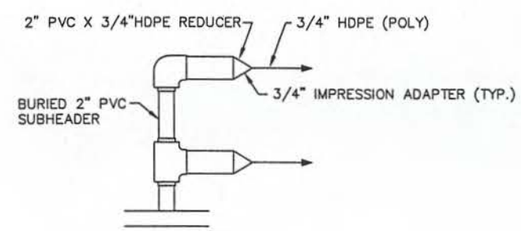
0 5 10 20 30
SCALE IN FEET

N
W — E
APPROX.



DETAIL 1/D-767533 1/D-767534
HDPE HEADER TO PVC SUBHEADER CONNECTION

NOT TO SCALE



DETAIL 2/D-767533 2/D-767534
PVC SUBHEADER TO HDPE LATERAL

NOT TO SCALE

LEGEND:

- COTTONWOOD TREE
- WILD ROSE
- WAX MYRTLE
- TYGON
- COYOTE BRUSH
- 1 GPH EMITTER

NOTE:

1) ORIENTATION OF EXISTING PLANTS TO CONTROL PLACEMENT OF DRIP SYSTEM EMITTERS.
2) ONE 2-GPH EMITTER SHALL BE PLACED AT EVERY SHRUB. 2-GPH EMITTERS ARE NOT SHOWN FOR CLARITY.
3) FOUR 1-GPH EMITTERS SHALL BE PLACED AROUND EACH TREE.

REGISTERED PROFESSIONAL ENGINEER
No. C 68285
EXP. 6/30/02
CIVIL
STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

0	ISSUE FOR CONSTRUCTION OF NO. 1 LANDFARM 12/98	CIK	
1	ISSUE FOR CONSTRUCTION OF NO. 2-5 LANDFARMS 3/12/99	CIK	
2	AS-BUILT 9/15/99	CIK	

Chevron
Richmond Refinery

SCALE AS NOTED DR. G. KOSSA DR. APP. DATE SEPT., 1998 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

91399, BBT

DRIP IRRIGATION SYSTEM DETAILS
SECTOR B3: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

S W.O. S.O. D-767535-2

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APPENDIX D

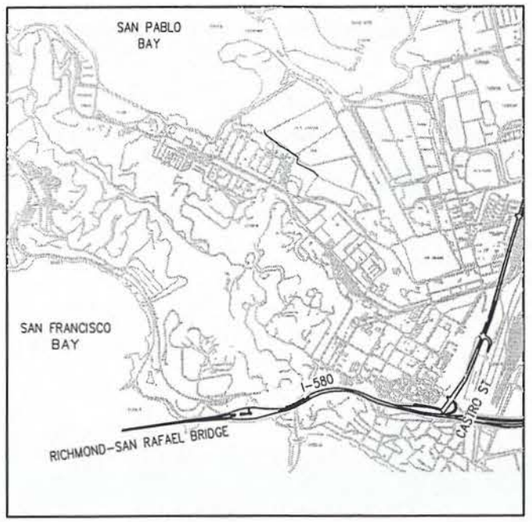
AS-BUILT DRAWINGS OF THE LANDFARMS STORM WATER PIPING PLAN, NO. 1 LANDFARM

Chevron

RICHMOND REFINERY
RICHMOND, CALIFORNIA

WASTE DISCHARGE ORDER PROJECT

LANDFARMS STORM WATER PIPING PLAN
LANDFARM NO. 1



LOCATION MAP

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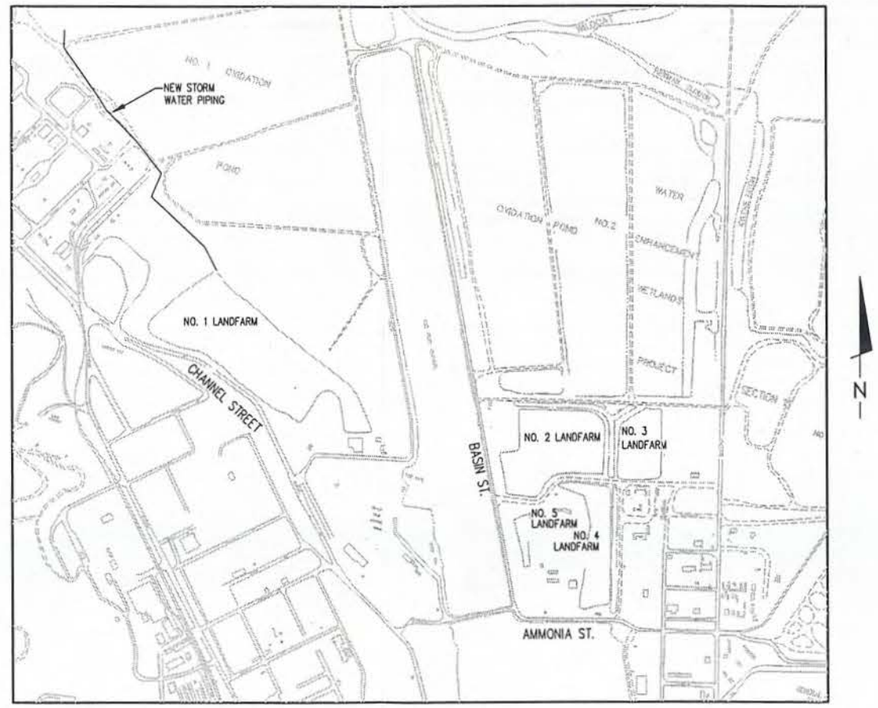
Scale in Feet



VICINITY MAP

0 500
Scale in Feet

DWG. NO.	TITLE
D-782416-1	STORM WATER PIPING - NO. 1 LAND FARM PLAN AND PROFILE
D-782417-1	STORM WATER PIPING - NO. 1 LAND FARM PLAN AND PROFILE
D-782418-1	HEADWALL PLAN AND SECTIONS
D-782419-1	OUTFALL AND MANHOLE DETAILS

GENERAL NOTES

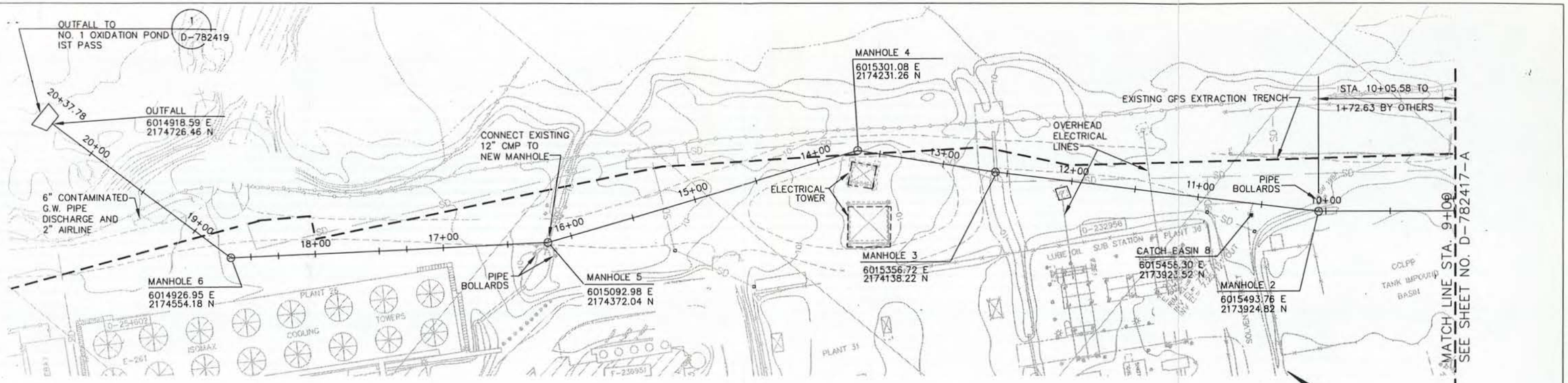
1. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE PLANS ARE FROM THE BEST INFORMATION AVAILABLE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF THE DELINEATION OF SUCH UNDERGROUND UTILITIES NOR FOR THE EVIDENCE OF OTHER BURIED OBJECTS OR UTILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.
2. THE ENGINEER MAY DIRECT THE CONTRACTOR TO ADJUST THE SHOWN PIPELINE ALIGNMENT TO AVOID UNKNOWN OBSTRUCTIONS OR OTHER CONFLICTS.
3. COORDINATES SHOWN ARE BASED ON 1983 NORTH AMERICAN DATUM (N.A.D.) COORDINATE SYSTEM.
4. ELEVATIONS SHOWN ARE BASED ON RICHMOND REFINERY DATUM. ELEVATION 0.00' EQUALS ELEVATION -2.17' NATIONAL GEODETIC DATUM (NGDV).
5. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING STRUCTURES, UTILITIES, AND FACILITIES. ANY DAMAGE TO EXISTING FACILITIES BY THE CONTRACTOR SHALL BE RESTORED (TO AN EQUAL OR BETTER CONDITION) OR REPLACED (TO AN EQUAL OR BETTER CONDITION) AT THE CONTRACTOR'S EXPENSE.

REGISTERED PROFESSIONAL ENGINEER
THOMAS M. KEEFE
No. C 58265
EXP. 6-30-02
CIVIL
STATE OF CALIFORNIA

AS-BUILT
SEPTEMBER 1999

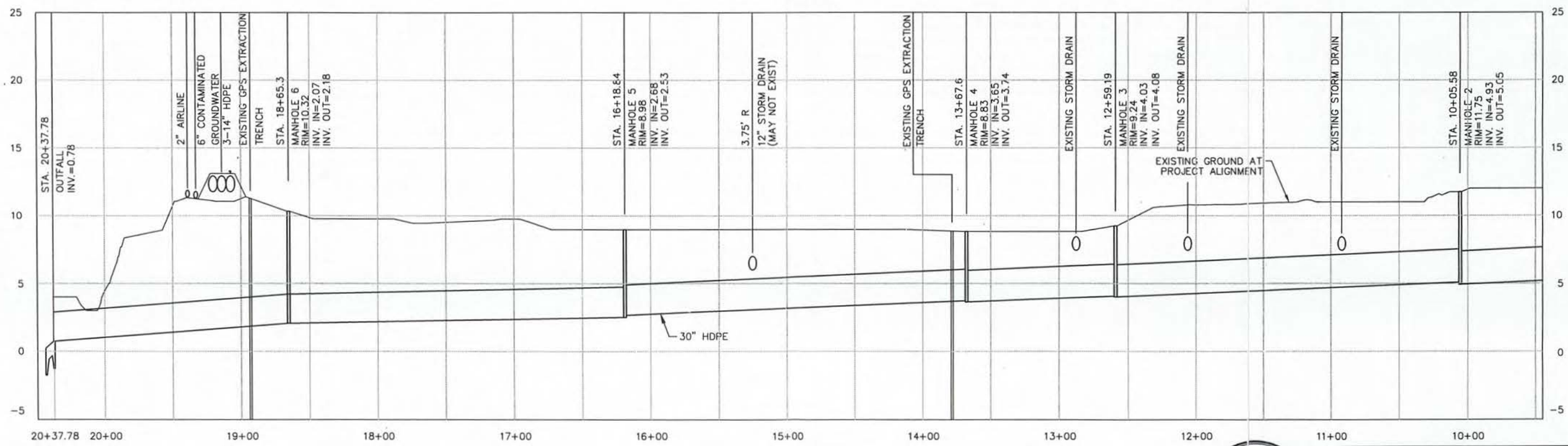
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
SAN FRANCISCO, CA.

42100001 \CHEV-RIC\S83\STORMDRAINLF1-3\ COVER 071897 1:1 091399ASLD



PLAN

0 100
Scale in Feet



HORIZ: 0 100 Scale in Feet

VERT: 0 10 Scale in Feet

PROFILE ALONG PROJECT ALIGNMENT

REGISTERED PROFESSIONAL ENGINEER
THOMAS M.
No. 58265
EXP. 9-30-99
CIVIL
STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
DCM GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 19000-900-003

REFERENCE DRAWINGS	REVISIONS		
	A ISSUED FOR REVIEW	1 AS BUILT 9/15/99	SLD
	B ISSUED FOR BID		

Chevron
Richmond Refinery

SCALE AS NOTED DR. JCO DR. APP. 3-10 DATE 3/20/97 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

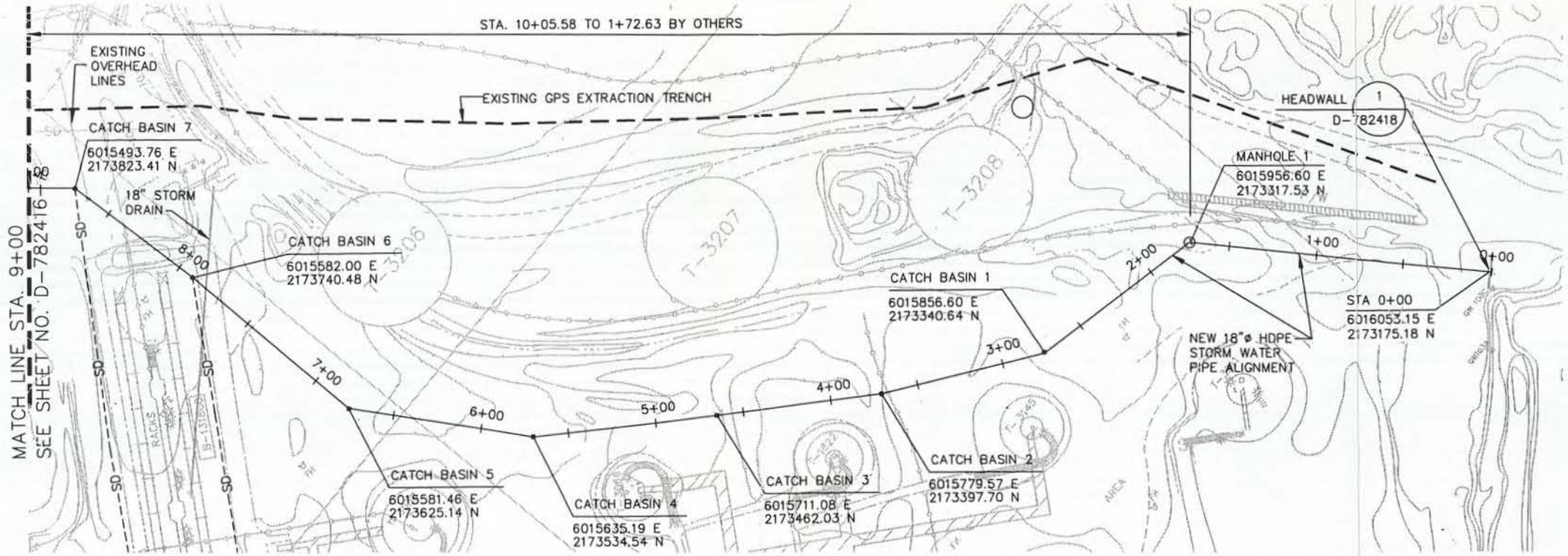
092399SLD

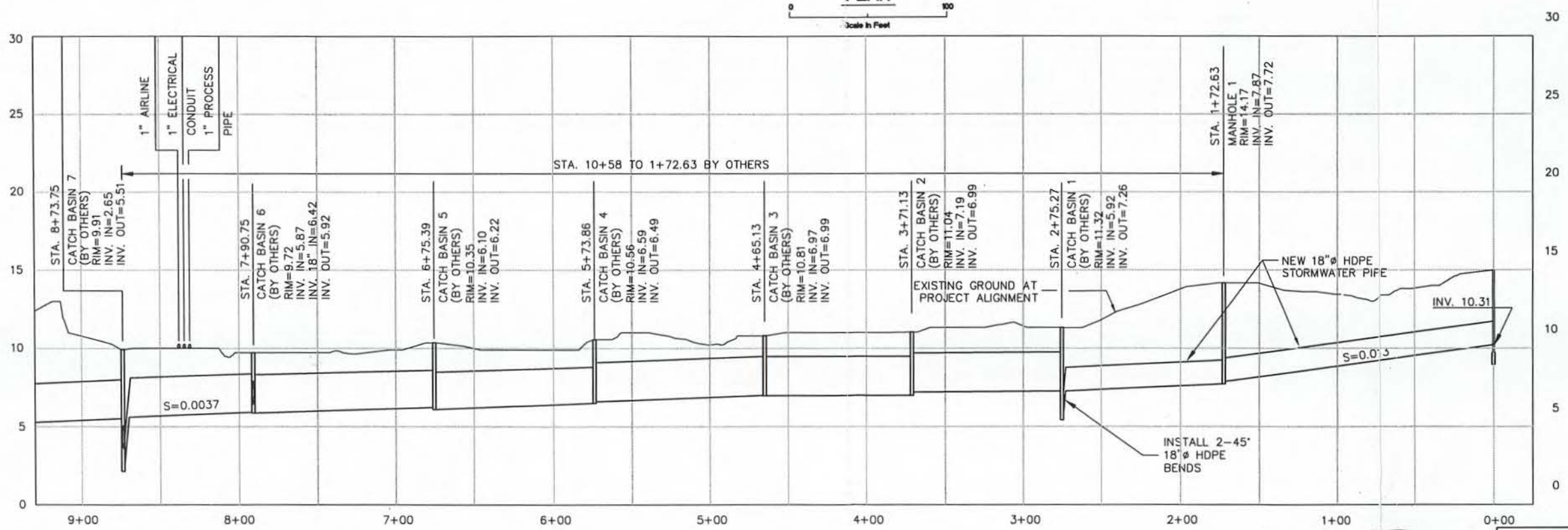
STORM WATER PIPING – NO. 1 LANDFARM
SECTOR 83: LANDFARMS
PLAN AND PROFILE
UTILITIES/ENVIRONMENTAL ABU

S W.O. S.O.

D-782416-1

19000900\CHEV-R\LFARMS\AS-BUILT\D-782416-1 081397 1:1 092399 A SLD





PROFILE ALONG PROJECT ALIGNMENT

REGISTERED PROFESSIONAL ENGINEER — THOMAS N. [illegible] — No. C 38365 — EXP. 6/30/99 — CIVIL — STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE GROUP — A DAMES & MOORE GROUP COMPANY
JOB NO. 19000-900-003

REFERENCE DRAWINGS	REVISIONS	
	A ISSUED FOR REVIEW	1 AS BUILT 9/30/99 SLD
	B ISSUED FOR BID	

Chevron — Richmond Refinery

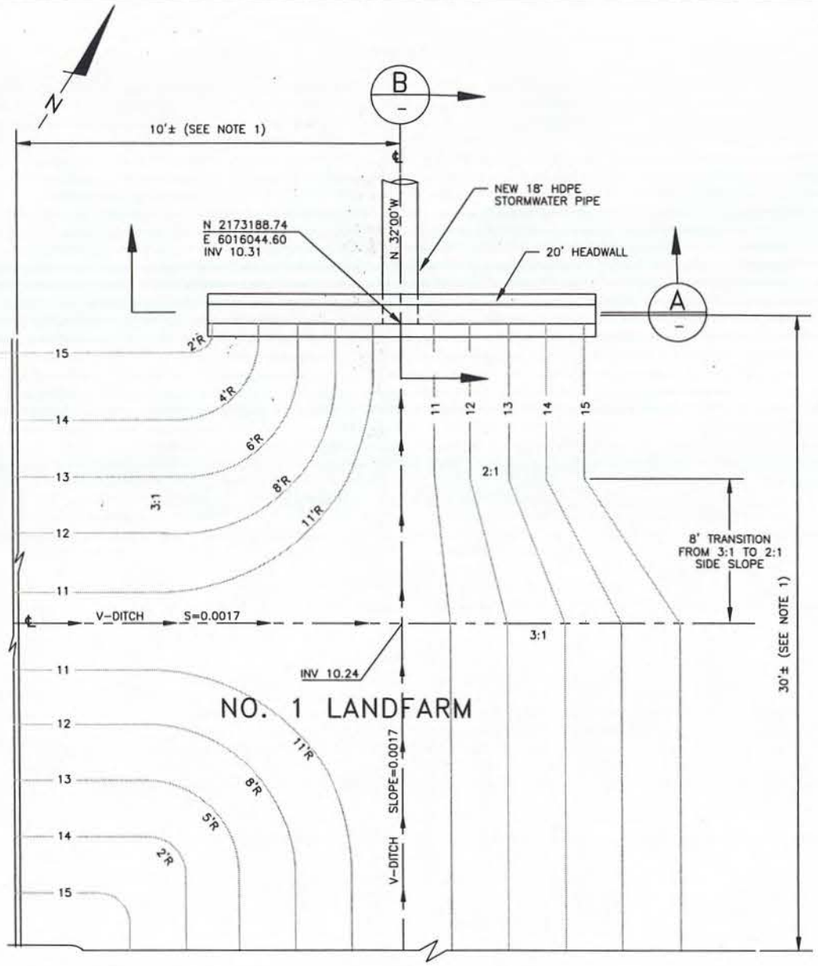
SCALE AS NOTED — DR. J. O'CONNELL — DR. APP. — DATE 071497 — APPROVED
ENGR. — ENGR. DEPT. — OPR'G. DEPT.

092399SLD

STORM WATER PIPING – NO. 1 LANDFARM
SECTOR 83: LANDFARMS
PLAN AND PROFILE
UTILITIES/ENVIRONMENTAL ABU

S — W.O. — S.O. — D-782417-1

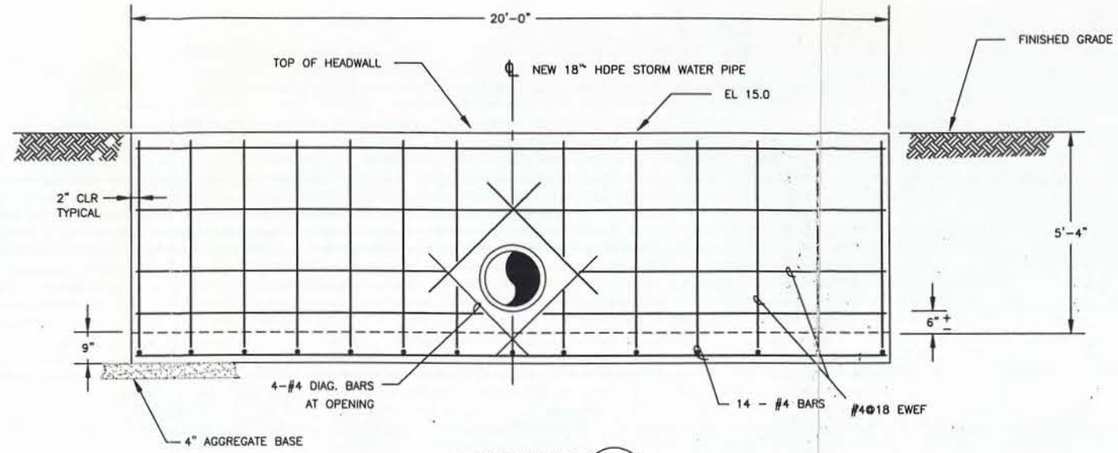
42100-001-043 \CHEV-R\STORM DRAIN LF 1 3\AS BUILT\ D-782417-1 071497 1:1 091499 A SLD



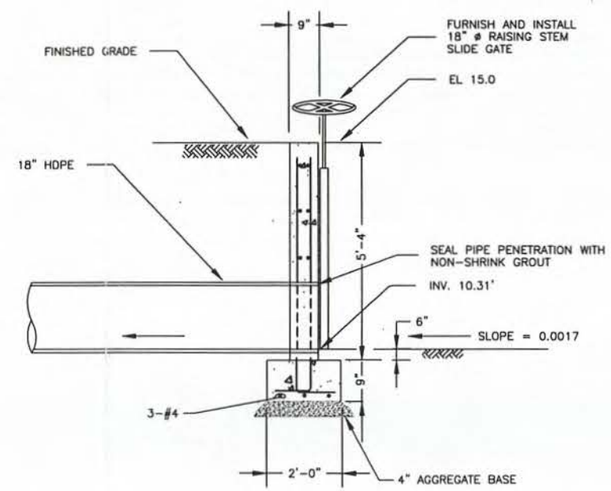
NOTES:

1. PROVIDE GRADING UP TO EDGE OF LANDFARM 1 BERM.
2. GRADES SHOWN ARE PROPOSED GRADING ONLY. SEE LANDFARM CLOSURE PLANS FOR FINAL GRADES.

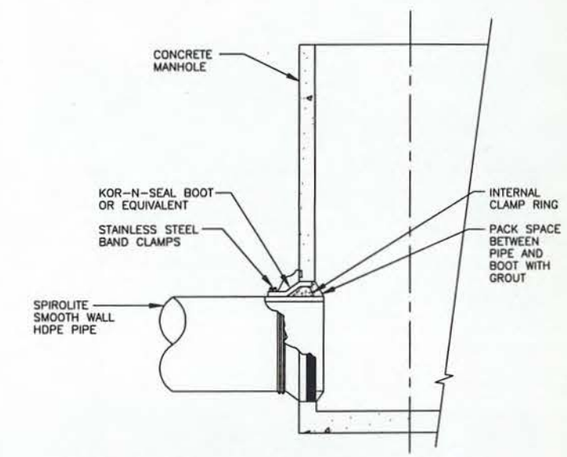
HEADWALL DETAIL 1
NOT TO SCALE D-782416



SECTION A
NOT TO SCALE



SECTION B
NOT TO SCALE



1. KOR-N-SEAL BOOT WILL BE PRECAST INTO MANHOLES 1 THROUGH 7. CONTRACTOR SHALL PROVIDE AND INSTALL KOR-N-SEAL BOOT AT THE INLET TO MANHOLE 1 AND AT THE OUTLET FOR MANHOLE 2.

DETAIL 2
HDPE PIPE TO MANHOLE CONNECTION
D-782419

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER THOMAS M. SLOAT No. C-58265 EXP. 6-30-01 CIVIL STATE OF CALIFORNIA

DCM GROUP
Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	REVISIONS						

A ISSUED FOR REVIEW	JCO	PFK		O ISSUED FOR CONSTRUCTION	
B ISSUED FOR BID	JCO	PFK		1 AS-BUILT 9/15/99	SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. JCO DR. APP. SLD DATE 9/21/99 APPROVED
ENGR. PFK ENGR. DEPT.
OPR'G. DEPT.

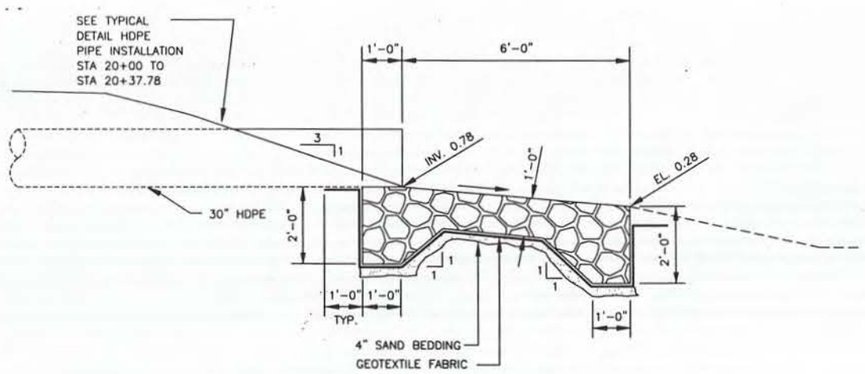
92499SLD

STORM WATER PIPING - NO. 1 LANDFARM
SECTOR 83: LANDFARMS
HEADWALL PLAN AND SECTIONS
UTILITIES/ENVIRONMENTAL ABU

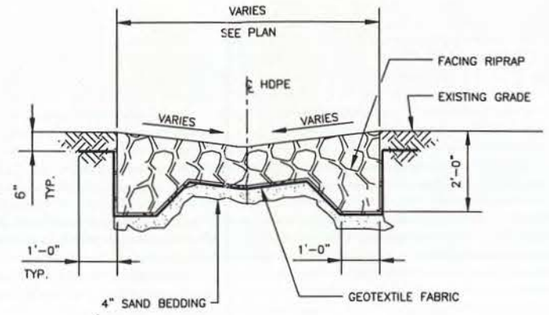
W.O.
S.O.

D-782418-1

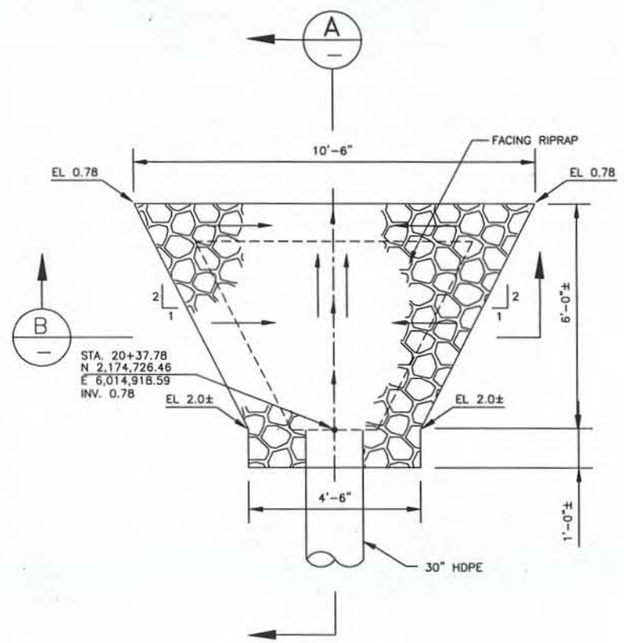
42100-001-043 \CHEV-R\SECT 83\STORM DRAIN LF 1 3\AS BUILT\ D782418-1 0714971:1 092499C SLD



SECTION A

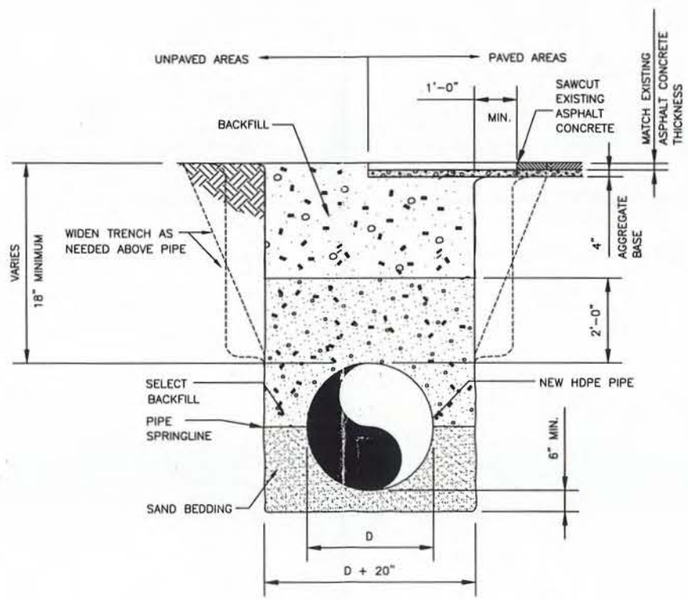


TYPICAL SECTION B



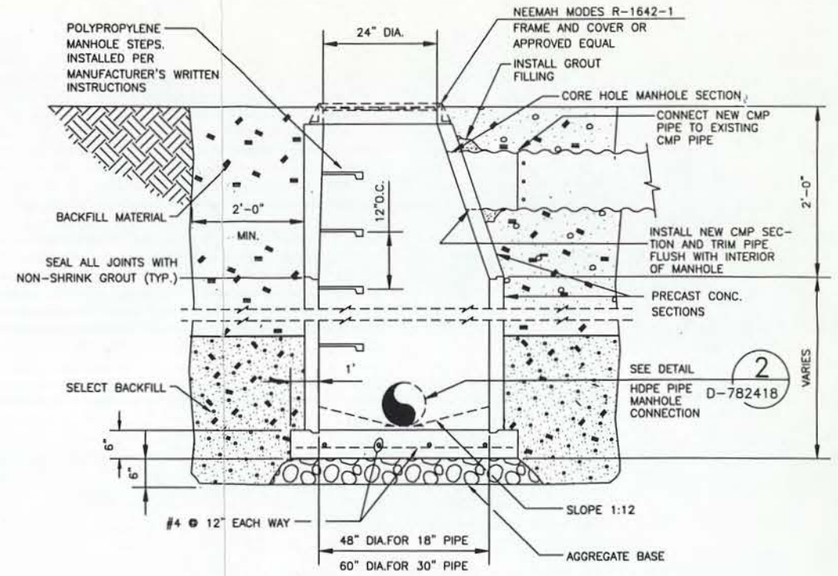
PLAN

OUTFALL DETAIL 1
NOT TO SCALE D-782416



TYPICAL DETAIL
HDPE PIPE INSTALLATION

NOT TO SCALE

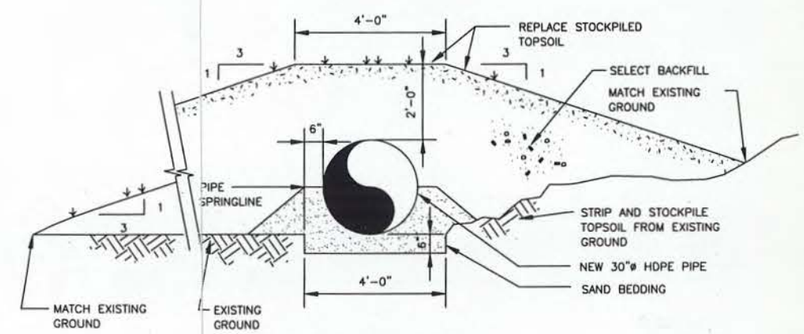


NOTES:

1. USING GRADE RINGS, ADJUST RING AND COVER SO BOTH ELEVATION AND SLOPE ARE 1" ABOVE GRADE IN OPEN AND GRASSY AREAS, OR FLUSH IN PAVED SURFACES.

TYPICAL DETAIL
PRECAST CONCRETE MANHOLE

NOT TO SCALE



TYPICAL DETAIL
HDPE PIPE INSTALLATION
STA 20+00 TO STA 20+37.78

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER THOMAS M. JOHNSON No. C 58265 EXP. 6/30/02 CIVIL STATE OF CALIFORNIA

DCM GROUP — Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	REVISIONS	
	A ISSUED FOR REVIEW	C ISSUED FOR CONSTRUCTION
	B ISSUED FOR BID	1 AS BUILT 9/15/99 SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. J. O'CONNELL DR. APP. DATE 081597 APPROVED
ENGR. PFK ENGR. DEPT.
OPR'G. DEPT.

92499SLD

STORM WATER PIPING – NO. 1 LANDFARM
SECTOR 83 – LANDFARMS
OUTFALL DETAILS AND MANHOLE
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-782419-1

42100001\CHEV-RIC\S83\ST.DRAIN.LF1-3\ASBLT\D7824191 081597 1:1 092499 B SLD

APPENDIX E

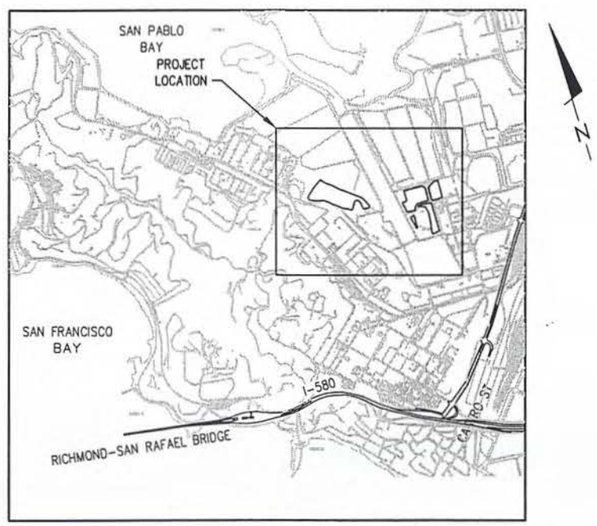
AS-BUILT DRAWINGS OF THE LANDFARM GROUNDWATER PROTECTION SYSTEM – SHALLOW EXTRACTION TRENCHES AND EXTRACTION SUMPS

Chevron

RICHMOND REFINERY
RICHMOND, CALIFORNIA

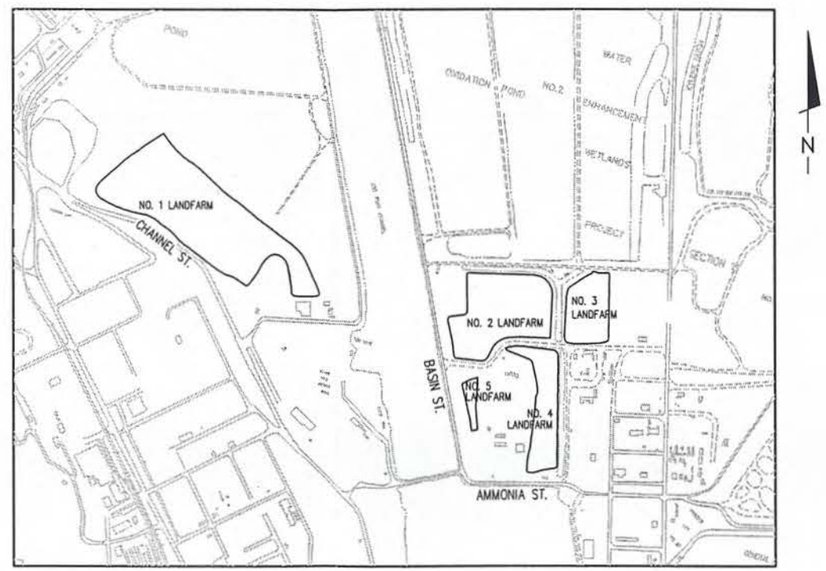
WASTE DISCHARGE ORDER PROJECT

GROUNDWATER PROTECTION SYSTEM
LANDFARMS CLOSURE PLAN
LANDFARMS NO. 1 THROUGH 5



LOCATION MAP

0 2000
Scale in Feet



VICINITY MAP

0 500
Scale in Feet

DWG. NO.	TITLE
D-767522	NO. 1 LANDFARM - GPS PUMP LOCATIONS
D-767523	NO. 2 THROUGH 5 LANDFARMS - GPS PUMP LOCATIONS
D-767524	PUMP INSTALLATION SCHEMATIC
D-767525	NO. 1 LANDFARM - SUMP NO. S-83071
D-767526	NO. 2 LANDFARM - SUMP NO. S-83070
D-767527	NO. 3 LANDFARM - SUMP NO. S-83069
D-767528	NO. 3 LANDFARM - SUMP NO. S-83068
D-767529	NO. 4 LANDFARM - SUMP NO. S-83067
D-767530	PUMP INSTALLATION DETAILS 1
D-767531	PUMP INSTALLATION DETAILS 2
D-767532	CONCRETE BASE DETAIL

GENERAL NOTES

1. COORDINATES SHOWN ARE BASED ON 1983 NORTH AMERICAN DATUM (N.A.D.) COORDINATE SYSTEM.

2. ELEVATIONS SHOWN ARE BASED ON RICHMOND REFINERY DATUM. ELEVATION 0.00' EQUALS ELEVATION -2.17' NATIONAL GEODETIC VERTICAL DATUM (NGVD).

3 ALL CONSTRUCTION SHALL CONFORM TO THESE PLANS AND SPECIFICATIONS.

4. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING UTILITIES AS SHOWN ON THESE DRAWINGS ARE FROM THE BEST INFORMATION AVAILABLE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF THE DELINEATION OF SAID UTILITIES NOR FOR THE EXISTENCE OF OTHER BURIED OBJECTS OR UTILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.

5. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING STRUCTURES, UTILITIES, AND FACILITIES. ANY DAMAGE TO EXISTING FACILITIES BY THE CONTRACTOR OR HIS SUBCONTRACTORS SHALL BE RESTORED (TO AND EQUAL OR BETTER CONDITION) OR REPLACED (TO AN EQUAL OR BETTER CONDITION) AT NO COST TO THE COMPANY.

6. THE CONTRACTOR IS RESPONSIBLE FOR ALL EROSION CONTROL REQUIREMENTS. CONTRACTOR SHALL IMPLEMENT ANY NECESSARY BEST MANAGEMENT PRACTICES AS OUTLINED IN THE PROJECT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER.

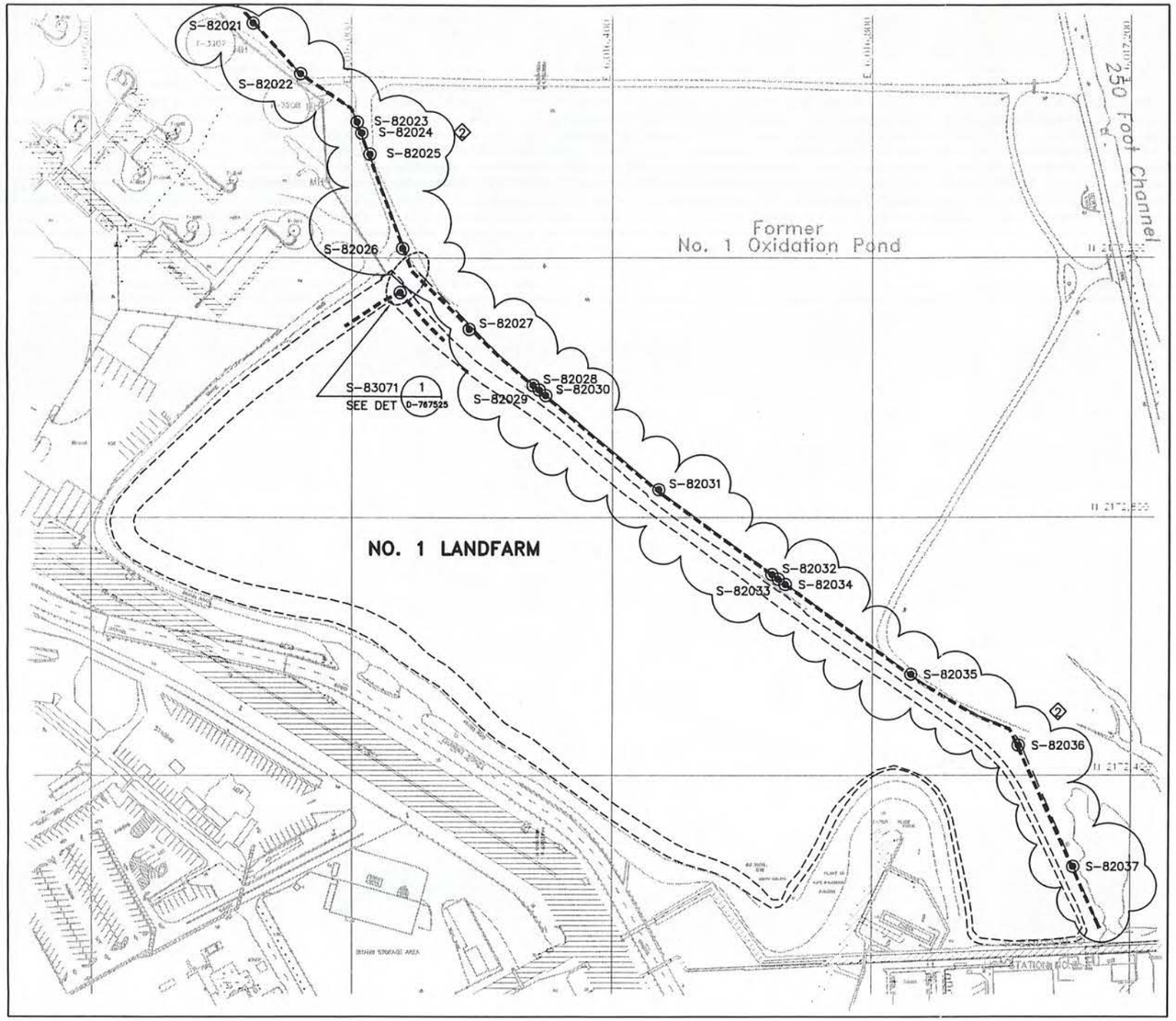
7. ALL HDPE ELBOWS AND TEES SHALL BE FLANGED.

AS BUILT
SEPTEMBER 1999

REGISTERED PROFESSIONAL ENGINEER
THOMAS M. [illegible]
No. C-[illegible]
EXP. 6-30-02
CIVIL
STATE OF CALIFORNIA

DAMES & MOORE GROUP
A DAMES & MOORE GROUP COMPANY
SAN FRANCISCO, CA.

42100001\CHEV-R\S83\GPS\ASBUILT\COVER 071897 1:1 090999 I CIK



NOTES:

1. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
2. LOCATION OF EXISTING GPS TRENCHES ARE APPROXIMATE.

ABBREVIATIONS:

ø, DIA	DIAMETER
BGS	BELOW GROUND SURFACE
CS	CARBON STEEL
CY	CUBIC YARDS
E	EAST
EF	EACH FACE
EL	ELEVATION
EOR	EDGE OF ROAD
EX	EXISTING
EWEF	EACH WAY, EACH FACE
GALV.	GALVANIZED
GPS	GROUNDWATER PROTECTION SYSTEM
HDPE	HIGH DENSITY POLYETHYLENE
MAX.	MAXIMUM
MIN.	MINIMUM
IE.	INVERT ELEVATION
INV	INVERT
LF	LINEAL FOOT
NO.	NUMBER
N	NORTH
O.C.	ON CENTER
SCH	SCHEDULE
SD	STORM DRAIN LINES
SS	STAINLESS STEEL
STA	STATION
TYP	TYPICAL

LEGEND:

- - - - - EXISTING GPS EXTRACTION TRENCH
- - - - - - DAYLIGHT LINE OF EXISTING V-DITCH
◉ EXISTING SUMP / NEW PUMP LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. KOSSA No. C 52847 EXP. 10/01 CIVIL STATE OF CALIFORNIA

N

0 100
Scale In Feet

Waste Discharge Order Project
DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512
NO. 1 LANDFARM – DITCH PLAN	D-767514

REVISIONS

0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1	AS-BUILT 9/15/99	AGP	
2	ADD EXTRACTION TRENCH AND SUMPS 3/01/00	SLD	

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

30100.SLD

NO. 1 LANDFARM-GPS PUMP LOCATIONS
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767522-2

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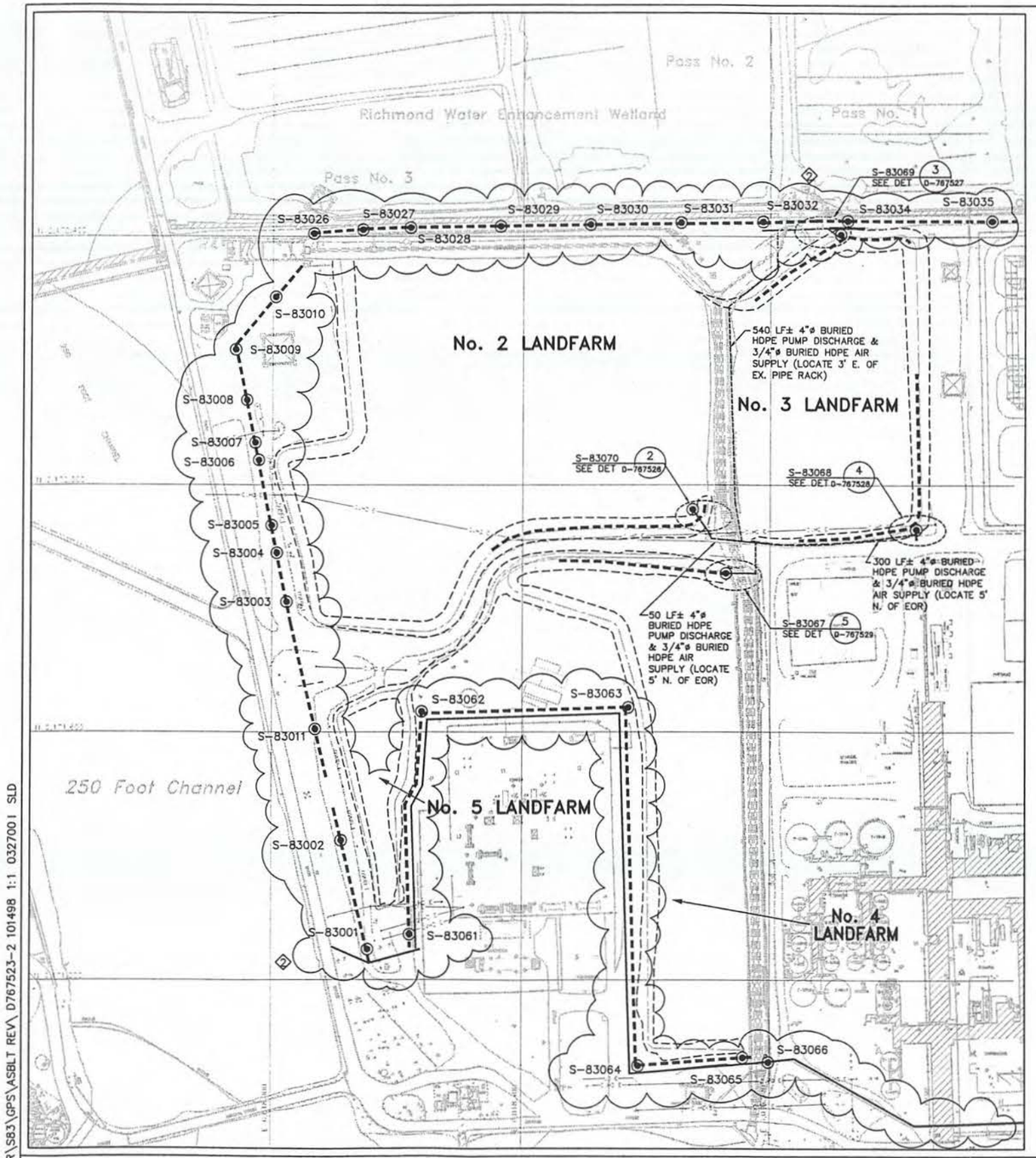

NOTES:

1. SEE DETAILS FOR PIPE LENGTHS IN VICINITY OF SUMPS.
2. HDPE PUMP DISCHARGE LINE OVER 100 LINEAL FEET IN LENGTH SHALL HAVE A FLANGED SECTION AT LEAST EVERY 100 LINEAL FEET.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EXISTING GPS EXTRACTION TRENCH
- DAYLIGHT LINE OF EXISTING V-DITCH
- EXISTING SUMP / NEW PUMP LOCATION
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING UNDERGROUND ELECTRICAL LINE
- BARRIER WALL

REGISTERED PROFESSIONAL ENGINEER THOMAS M. FREST No. C 68884 EXP. 6-30-02 CIVIL STATE OF CALIFORNIA

N

0 100 Scale in Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
NO. 2 THROUGH 5 LANDFARMS - FINISHED GRADING PLAN	D-767515
NO. 2 THROUGH 5 LANDFARMS - DITCH PLAN	D-767518

REVISIONS							
0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK		2	ADD EXTRACTION SUMPS AND BARRIER WALL 3/24/00	SLD	
1	AS-BUILT 9/15/99	AGF					

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Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

NO.2 THROUGH 5 LANDFARMS - GPS PUMP LOCATIONS
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767523-2

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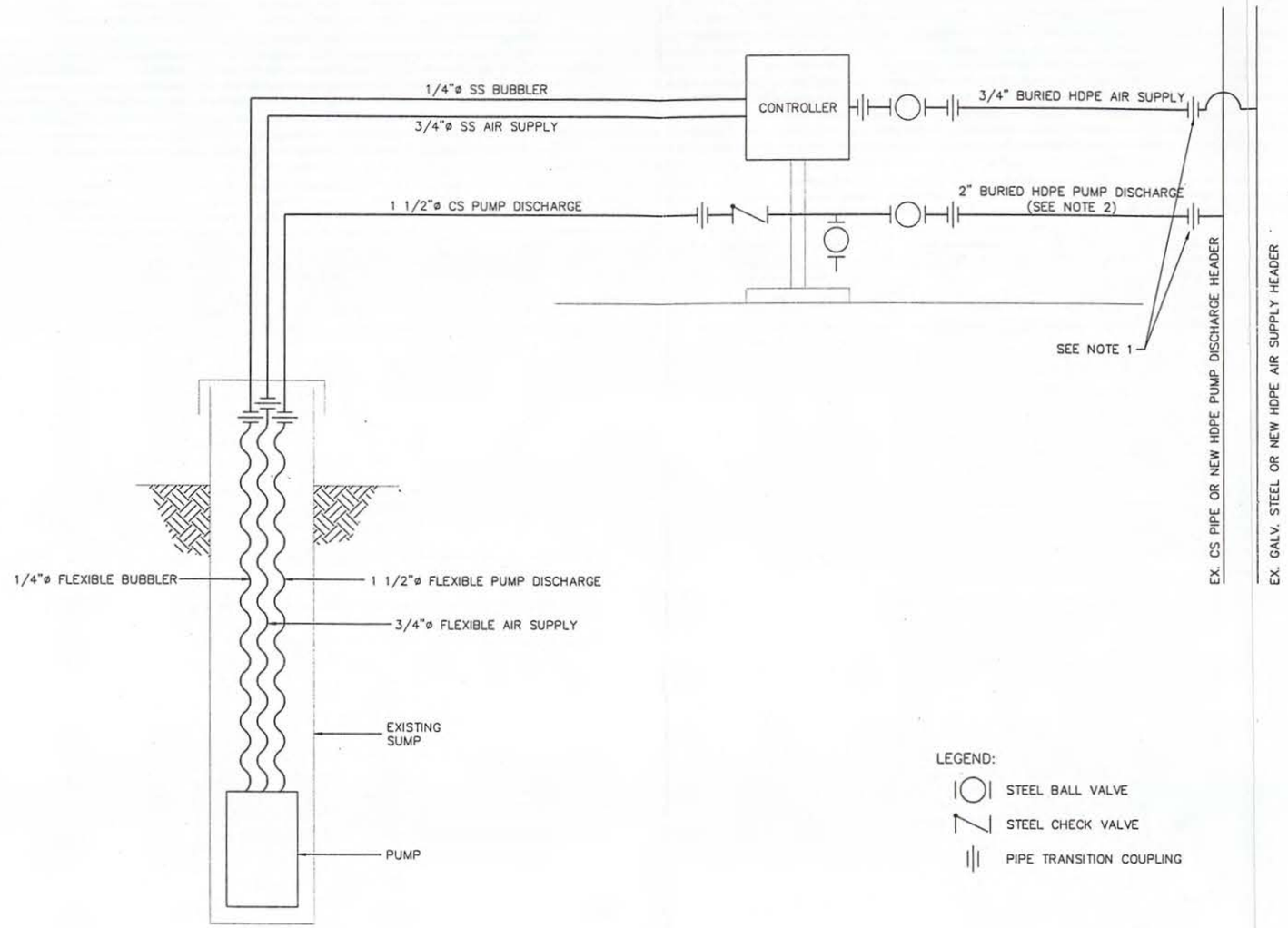
032700L SLD



LEGEND:

- STEEL BALL VALVE
- STEEL CHECK VALVE
- PIPE TRANSITION COUPLING

NOTES:

1. TRANSITION COUPLINGS AT CONNECTION TO GPS HEADERS ARE ONLY NECCESSARY WHEN CONNECTING TO EXISTING METAL MAIN LINES. SEE SUMP DETAILS 1 THROUGH 5 FOR SITE SPECIFIC DETAILS.
2. PIPE SHALL BE CS FOR SUMP S-83071.
3. SEE D-767530 AND D-767531 FOR PUMP INSTALLATION DETAILS.

REGISTERED PROFESSIONAL ENGINEER THOMAS M. BRADY No. C 68295 EXP. 6/30/00 CIVIL STATE OF CALIFORNIA

DCM GROUP

Waste Discharge Order Project

DAMES & MOORE

A DAMES & MOORE GROUP COMPANY

JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

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1	AS-BUILT 9/15/99	AGP

Chevron

Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED

ENGR. TWS ENGR. DEPT.

OPR'G. DEPT.

91099SLD

PUMP INSTALLATION SCHEMATIC

SECTOR 83: LANDFARMS

GROUNDWATER PROTECTION SYSTEM

UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O.

D-767524-1

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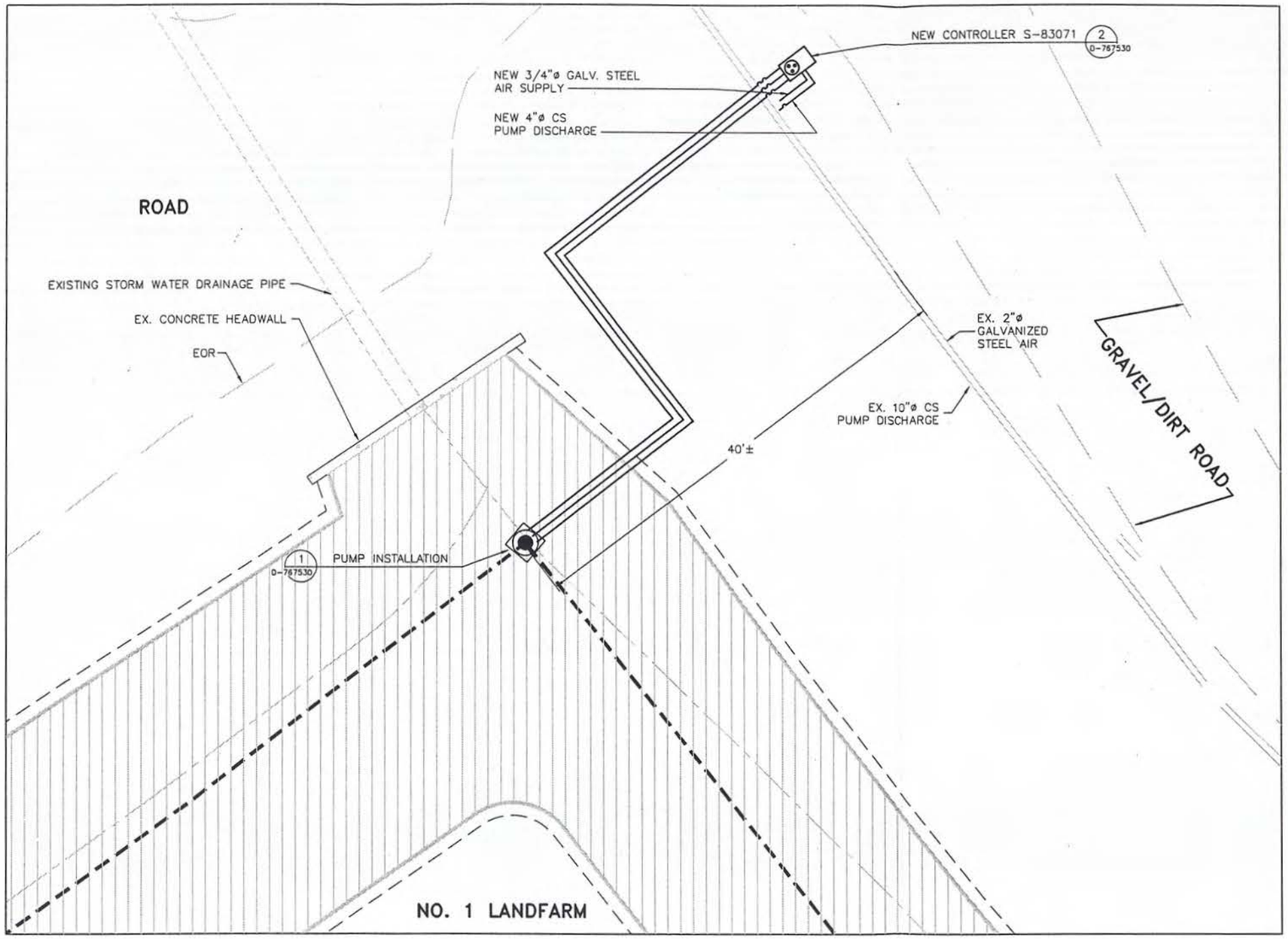

DETAIL 1 / D-767522
S-83071

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND UTILITY LINES.
2. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
3. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- CONTROLLER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. WEST No. C 62265 EXP. 6/30/99 CIVIL STATE OF CALIFORNIA

N

0 5
Approximate Scale in Feet

Waste Discharge Order Project
DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS		
LFM1-STORM WATER PIPING	D-782416-1	
LFM1-STORM WATER PIPING	D-782417-1	
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1	
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1	

REVISIONS		
0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK
1	AS-BUILT 9/15/99	AGP

Chevron
Richmond Refinery

92499SLD

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
ENGR. THS ENGR. DEPT.
OPR'G. DEPT.

NO. 1 LANDFARM - SUMP NO. S-83071
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767525-1

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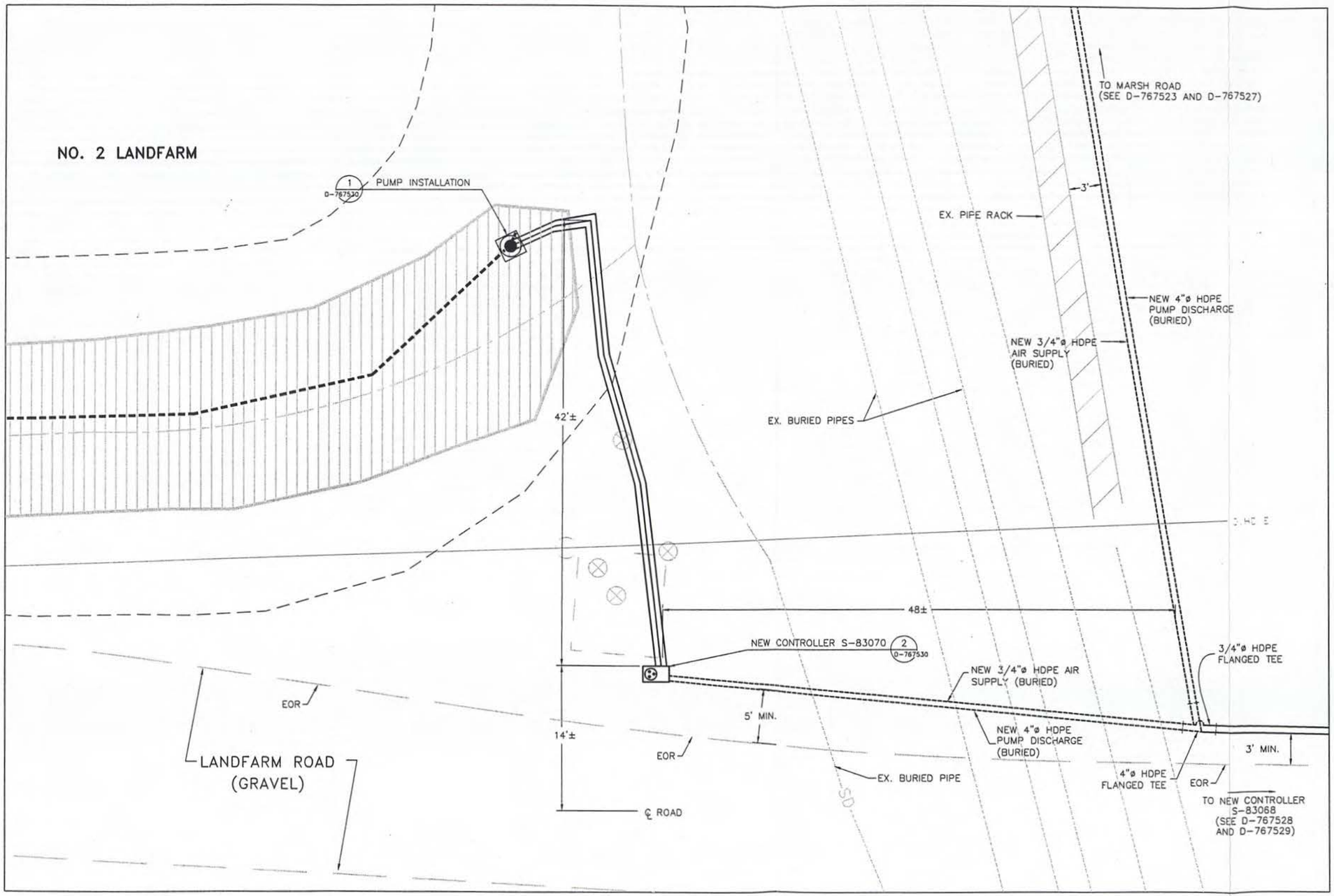

DETAIL 2 D-767523
S-83070

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND UTILITY LINES.
2. ALL NEW HDPE PIPING TO BE BURIED.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. OVERHEAD ELECTRICAL
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- NEW BURIED PIPELINE
- CONTROLLER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. SHEPPARD No. C 58265 EXP. 6/30/01 CIVIL STATE OF CALIFORNIA

N

0 5
Approximate Scale In Feet

DCM GROUP
Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
LFM1-STORM WATER PIPING	D-782416-1
LFM1-STORM WATER PIPING	D-782417-1
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1

REVISIONS		
0 ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1 AS-BUILT 9/15/99	AGP	

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Richmond Refinery

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OPR'G. DEPT.

92499SLD

NO. 2 LANDFARM – SUMP NO. S-83070
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767526-1

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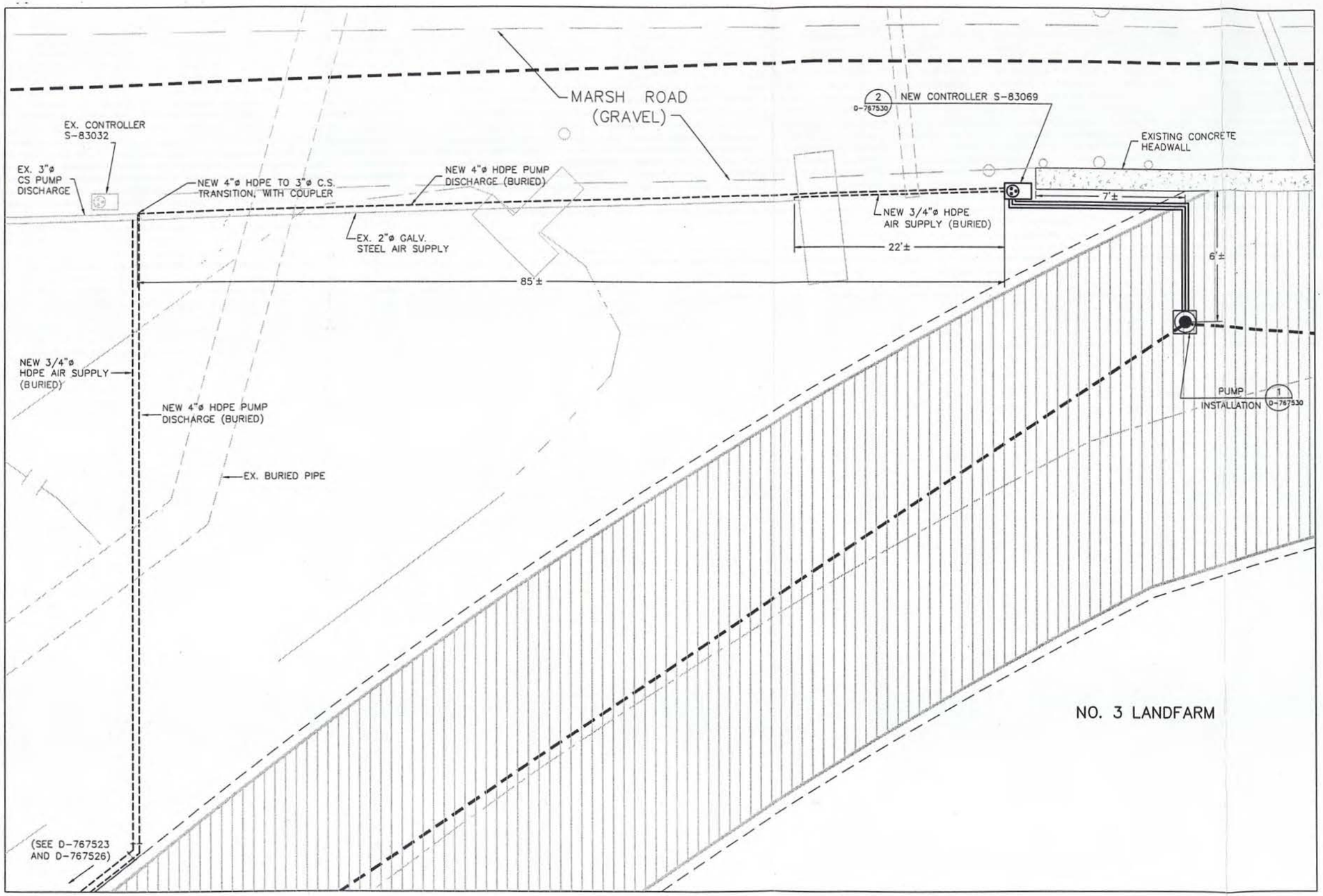

DETAIL 3 D-767523
S-83069

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND UTILITY LINES.
2. ALL NEW HDPE PIPING TO BE BURIED.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. OVERHEAD ELECTRICAL
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- NEW BURIED PIPELINE
- CONTROLLER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. GRANT No. C 58205 EXP. 6/30/01 CIVIL STATE OF CALIFORNIA

N

0 5
Approximate Scale in Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

LFM1-STORM WATER PIPING	D-782416-1
LFM1-STORM WATER PIPING	D-782417-1
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1

REVISIONS

0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS	12/98	CIK
1	AS-BUILT	9/15/99	AGP

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

92699SLD

NO. 3 LANDFARM – SUMP NO. S-83069
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767527-1

42100001\CHEV_R\S83\GPS\ASBLT\D767527-1 101398 1:1 090999 G CIK

Appendix K
Revised Landfarms Post-Closure Monitoring Plan (April 2, 2015)

REVISED LANDFARMS POST-CLOSURE MONITORING PLAN

Revised: April 2, 2015

Revised: January 7, 2002

Original: March 11, 1998

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- 2.2 Vegetated Layer 2
- 2.3 Surface Grading 3
- 2.4 Surface Drainage Control Facilities 3
- 2.5 Groundwater Protection System 3

3.0 LANDFARMS POST-CLOSURE MONITORING PLAN 5

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- 3.2 Post-Closure Usage 5
- 3.3 Vegetation Monitoring 5
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APPENDICES

Appendix A. As-Built Drawings of the Landfarm Closure Construction

Appendix B. As-Built Drawings of the Landfarm Groundwater Protection System – Shallow Extraction Trenches and Extraction Sumps

LANDFARMS POST-CLOSURE MONITORING PLAN

1.0 INTRODUCTION

This *Revised Landfarms Post-Closure Monitoring Plan* was prepared by Leidos Engineering, LLC (Leidos) on behalf of Chevron Environmental Management Company (CEMC) and updates the January 7, 2002 *Revised Landfarms Post-Closure Monitoring Plan* (URS, 2002). This update takes into account the findings from the first 16 years of vegetation growth and soil monitoring at Landfarms 1 through 5, located at the Chevron Richmond Refinery. The as-built conditions of the Landfarms are presented in *Revised Landfarms Closure Construction Completion Certification Report* (Dames & Moore, 2000). This plan was originally prepared by Dames & Moore (BEDM) in March 1998 at the request of Chevron to respond to the California EPA Department of Toxic Substances Control (DTSC) Completeness Determination letter dated December 10, 1997. The 1998 plan was revised in 2002 and discussed the vegetation and topographical conditions present at the site, and how those conditions pertained to post-closure monitoring. The 2002 modifications from the original post-closure monitoring plan, made during closure construction activities were:

- Addition of shallow trenches and additional sumps to the Groundwater Protection System (GPS); and
- Planting of grasses, shrubs, and trees in one season rather than planting grasses in the first season and shrubs and trees in the next season.

In compliance with applicable regulations, Chevron closed the Landfarms as Hazardous Waste Land Treatment units (HWLT) by establishing a final vegetated cover over the units. Regulatory objectives for the closure of land treatment facilities, as spelled out in Title 22 California Code of Regulations (CCR) 66265.280(a), are:

- Prevention of the migration of hazardous waste and hazardous waste constituents from the treated area into the groundwater;
- Prevention of the release of contaminated runoff from the facility into surface water;
- Prevention of the release of airborne particulate contaminants caused by wind erosion; and
- Compliance with Section 66265.276 concerning the growth of food-chain crops.

2.0 CLOSURE UNIT DESCRIPTION

The landfarm closure was designed to allow for continual passive biodegradation of oily soil, to reduce surface water infiltration through the surface of landfarm fills and soils, and to prevent lateral off-site migration of “A” Zone groundwater from landfarm sites. The performance goals for the closure construction are outlined in Title 22 CCR Section 66265.111, which require that facilities be closed in a manner that:

- Minimize the need for further maintenance
- Controls, minimizes or eliminates to the extent necessary, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall of runoff,

or waste decomposition products to the ground or surface waters or to the atmosphere to protect human health and the environment

The landfarm closure construction activities were completed in the summer of 1999. The following sections discuss the current landfarm configuration and topography, vegetated layer, surface grading, surface drainage control facilities, and groundwater protection system. Please refer to the *Revised Landfarms Closure Construction Completion Certification Report* (Dames & Moore, 2000) for more details.

2.1 CLOSURE UNIT CONFIGURATION AND TOPOGRAPHY

The Landfarms were regraded into low mounds to facilitate surface drainage, improve the stability of the perimeter slopes, allow for settlement of the final cover while maintaining proper drainage, and improve the visual appearance of the sites. Grading involved cutting in some areas and using the cut material as fill in other areas, with clean imported fill used to make up shortfalls in the required fill volumes. A layer of clean soil covers the entire landfarm area and serves to prevent surface run-off from direct contact with waste material and prevent wind erosion of the wastes. Fill within the closure unit was graded and lightly compacted with light tracked equipment to support the construction of the final landfarm cover while allowing penetration of vegetation roots. Fill spreading and compaction were performed in 8-inch lifts by tracked vehicles. Use of heavy equipment and trucks was minimized where practical.

Historical perimeter berms were also regraded to serve as a foundation for drainage ditches and provide lateral support for the landfarm soils. The perimeter berms were evaluated to locate areas that were soft or loose. Placed soil was tested in accordance with ASTM D-1557 to confirm that the materials were compacted to at least 90 percent of maximum dry density to a depth of 2 feet. Refer to Section 2.4 for details on surface drainage control facilities.

2.2 VEGETATED LAYER

The top 12-inch soil layer of the cover consists of two layers. The 6-inch-thick lower clean fill layer provides a firm base suitable for supporting future shrubs and trees. The 6-inch upper layer consists of relatively loose, nutrient-rich topsoil which acts to facilitate initial plant growth. Prior to establishing vegetation, erosion mats were placed on the steeply sloped areas that were identified as being more susceptible to erosion.

The purpose of establishing vegetation on the Nos. 1 through 5 Landfarms was to reduce soil erosion by water and wind and to increase microbial populations in the vadose zone leading to continued passive biodegradation of remaining petroleum hydrocarbons. The vegetation specified for the final cover was similar to the native grasses, plants, and trees, which resulted in a low-maintenance cover with limited need for long-term irrigation.

A variety of plant and tree species were used in order to draw from the largest population of species adapted to the soils and climatic conditions of the Landfarms. The planting of grasses, shrubs, and trees was completed in summer 1999 rather than vegetating the Landfarms with grasses in the first year and planting shrubs and trees in the subsequent years, as specified in the *Revised Closure Plan* (Dames & Moore, March 1998). Faster growing grasses and herbaceous plants (shrubs) were planted on the Landfarms to minimize wind and water erosion. Trees were planted in a closely spaced grid pattern with the shrubs and trees selected and planted with the intent that the associated rooting depths will inhabit the entire vadose zone. The grasses were selected for their shallow (0-6 inches) depth penetration; the shrubs were selected for their

medium (6-12 inches) depth penetration; and the trees were selected for their deep (greater than 12 inches) depth penetration. After 16 years of monitoring the vegetation during post-closure care, Chevron has noted that the grasses adequately stabilize the cover from wind and water erosion. Beyond mowing, the grasses need little maintenance and only natural precipitation to maintain a healthy cover on the landfarms. The trees have continued to need irrigation to be healthy. As described in section 3.3 Vegetation Monitoring, Chevron will no longer irrigate the trees saving approximately 2 million gallons of water annually.

2.3 SURFACE GRADING

The final surface of the vegetative portions of the Landfarms were graded with 4 percent minimum slopes to accommodate long-term settlement and are intended to retain 3 percent minimum slopes after settlement. The areas surrounding the closure units were graded to drain away from the closure units such that any runoff from the surrounding areas will flow away from the Landfarms surfaces.

2.4 SURFACE DRAINAGE CONTROL FACILITIES

The as-built surface drainage control facilities are shown in plan view on drawing D-767512-1 for Landfarm 1 and drawing D-767515-1 for Landfarms 2-5, which are included as Appendix A. Surface runoff from the exterior slopes of the closure units is collected in perimeter drainage ditches. Generalized ditch details are shown on drawing D-767513-1. More steeply sloped ditch areas were lined and covered with erosion control mats and vegetation to minimize potential erosion. Runoff at the Landfarms is collected within the ditches and routed to the Refinery's clean stormwater impoundment. Runoff collected in the drainage ditches at Landfarm No. 1 flows via gravity through the slide gate and headwall located at the northeast corner of the landfarm and is discharged to the first pass of the No. 1 Oxidation Pond. Runoff from Landfarm Nos. 2 through 5 drains to the slide gate and headwall north of Landfarm No. 3 and is discharged to Pass No. 3 of the Richmond Refinery Water Enhancement Wetlands (Richmond Wetlands). Runoff generated from the Landfarms is discharged per the Refinery's current National Pollution Discharge Elimination System (NPDES) permit.

2.5 GROUNDWATER PROTECTION SYSTEM

As part of the overall Refinery-wide Groundwater Protection System (GPS), groundwater extraction trenches were installed along the downgradient perimeter of the Landfarms between 1990 and 1993. The Landfarms GPS also serves as corrective action for the landfills that underlie portions of the Landfarms (see Revised Landfarms Closure Plan, Section 3.2.1). The objective of the GPS for the entire Refinery, including the Landfarms areas, is to establish and maintain a physical or hydraulic barrier to prevent the off-site movement of potentially contaminated "A" Zone groundwater.

During the Landfarm closure construction, additional GPS features were added to control shallow groundwater and to facilitate recovery of light non-aqueous phase liquid (LNAPL) hydrocarbon if encountered in the "A" Zone. Specifically, shallow extraction trenches were installed at five locations, as shown in drawings D-767522-2 and D767523-2 of Appendix B. Polyvinyl chloride (PVC) pipes were installed at low points of the landfarm ditches to serve as groundwater collection sumps. Pneumatically controlled extraction pumps were installed in the sumps to recover "A" Zone groundwater from under the Landfarms.

The GPS includes a perimeter system that consists of either extraction trenches, or a combination of soil/bentonite barrier walls with either extraction trenches or extraction wells (also shown in drawing D-767523-2 of Appendix B). Groundwater is continually pumped from the trenches to treatment facilities, and the resulting hydraulic depression establishes and maintains a capture zone intended to prevent the migration of potentially contaminated groundwater past the GPS alignment. The laterally extensive Bay Mud deposit constitutes the floor of the system and restricts the flow of groundwater from the "A" Zone to the "C" Zone. The GPS concept and details were approved by the RWQCB as appropriate corrective action for potentially contaminated "A" Zone groundwater.

The major GPS groundwater control features for the Landfarms include: 1) a laterally extensive deposit of low-permeability Bay Mud underlying the entire Landfarms site; 2) a physical barrier (soil-bentonite slurry wall) to the northeast adjacent to Castro Creek and to the south of Nos. 2 through 5 Landfarms; 3) an "A" Zone groundwater extraction trench or wells (hydraulic barrier) between the northeast perimeter of No. 1 Landfarm, along the north and west perimeter of Nos. 2 through 5 Landfarms, and in the gap in the barrier wall where it crosses the Deep Water Outfall Project (DWOP) pipelines; 4) a transfer system for extracted groundwater; and 5) a potentiometric and water quality monitoring system sufficient to evaluate the effectiveness of the GPS. This configuration provides hydraulic control and, in some areas, physical control on the downgradient and cross gradient sides of the Landfarms.

The design of the extraction trenches and wells was based on the groundwater flow characteristics of the "A" Zone water-bearing unit. In general, groundwater flows to the north in the vicinity of Landfarms 2 through 5. Groundwater flow in the vicinity of Landfarm 1 is generally to the northeast, directly toward GPS. Details of the GPS are included in Appendix J of the *Revised Landfarms Closure Plan*, dated December 31, 1996 (BEDM, 1996).

The Environmental Operations Division (EOD) of the Refinery's Utilities/Environmental Area Business Unit (U/E) and Chevron Environmental Management Company (CEMC) are responsible for operating and maintaining the GPS. EOD and CEMC subcontractor personnel visually inspect all pipelines and controllers several times a week to assure that the system is operating properly. The design of the GPS extraction system, with pumps located at roughly 200-foot intervals, is inherently redundant. Hence the malfunction of any one pump does not reduce the effectiveness of the system at containing the Landfarms groundwater as the groundwater normally recovered by the malfunctioning pump will flow laterally towards the adjacent pumps until the pump is repaired or replaced. CEMC's subcontractors for GPS operation maintain a supply of spare pumps, so pump replacement can be performed without substantial delay. If needed, Refinery maintenance personnel supplement the GPS pumps with temporary air or diesel powered pumps.

The effectiveness of the GPS in containing "A" Zone groundwater is monitored and reported to the RWQCB and DTSC as part of the Refinery-Wide Groundwater Monitoring Program (RGMP). The scope of the RGMP is specified in the Self-Monitoring and Reporting Program of RWQCB Orders R2-2011-0036 and R2-2012-0015. "A" Zone piezometric monitoring is performed as part of the RGMP to demonstrate that a hydraulic barrier is maintained by the GPS at the perimeter of the closure units. Chemical monitoring in the "A" Zone supplements piezometric monitoring and assists in evaluating the effectiveness over time of the GPS corrective action. Chemical monitoring in the "C" Zone verifies that water quality below the Bay Mud at the point of compliance has not been degraded.

3.0 LANDFARMS POST-CLOSURE MONITORING PLAN

3.1 GENERAL

The Landfarms post-closure monitoring plan includes a variety of qualitative and quantitative monitoring parameters and inspections including surface settlement, final cover integrity, surface drainage control facilities, groundwater quality, and GPS piezometric monitoring. Post-closure monitoring and reporting for most monitoring tasks are performed on a semi-annual basis. The frequency of monitoring and reporting will be evaluated annually and, if warranted, a recommendation for modification will be submitted to the DTSC and RWQCB for approval.

Access to the sites during post-closure is restricted by the overall Refinery guard and security system maintained by Plant Protection. Appropriate warning signs are placed around the perimeters of the closed Landfarms similar to those discussed in Section 2.2.1 of the Closure Plan.

During the post-closure period, the Chevron contact person is the Refinery Health, Environment and Safety Manager located at:

Chevron USA Inc
Richmond Refinery
P.O. Box 1272
Richmond, California 94802
Attention: Manager HES
(510) 242-4000

In general, inspections of the Landfarms are performed, at a minimum, once per year prior to the onset of the rainy season. The inspections are performed by qualified individuals and include, but are not limited to, observations of the final cover (including vegetation), drainage control facilities, piezometers, groundwater monitoring wells, GPS extraction system including pumps and piping, security systems, and for signs of differential settlement that may lead to ponding. The inspectors prepare an Annual Post-Closure Monitoring Report of their findings and correct any maintenance needs or deficiencies.

3.2 POST-CLOSURE USAGE

No Refinery operations are currently planned on the Landfarms sites. Drawings D-767512-1 and D-767515-1 in Appendix A show the as-built post-closure configuration of the Landfarms. The only traffic anticipated on the covers of the closure units would be limited to that required to operate and maintain the GPS and cover vegetation. If, at some time in the future, Chevron plans to use the sites for other purposes, approvals would be required from the appropriate government agencies (the DTSC at a minimum) and additional maintenance may be required to maintain the integrity of the final covers. Monitoring frequencies that differ from an annual frequency are described below.

3.3 VEGETATION MONITORING

After closure, an inspection of the vegetated surface of the Landfarms was performed quarterly to ensure the establishment of the poplar trees and to evaluate plant germination, irrigation, and the need for fertilization, mowing, and reseeding. The inspections were intended to identify whether the vegetation was adequately covering the surface of each Landfarm, symptoms of drought stress, chlorosis (indicative of nutrient deficiency), and the need for mowing and/or reseeding.

After 16 years of monitoring the vegetation during post-closure care, Chevron has noted that the grasses adequately stabilize the cover from wind and water erosion. Beyond mowing, the grasses need little maintenance and only natural precipitation to maintain a healthy cover on the landfarms. The trees have continued to need irrigation to be healthy. Chevron will no longer maintain or irrigate the trees saving approximately 2 million gallons of water annually. Quarterly inspections to assess the condition of the vegetation are no longer necessary. The Landfarms will be inspected annually prior to the start of the rainy season to assess the condition of the vegetation and any maintenance needs.

Soil monitoring has been performed semi-annually to document maintenance of soil pH and to evaluate soil nutrient conditions for the poplar trees' growth. After 16 years of growth, the trees are well-established and fertilization is no longer necessary. Chevron will no longer be monitoring soil nutrient needs. Additionally Chevron will no longer measure soil moisture since there will be no irrigation of the vegetation.

3.4 VEGETATION MAINTENANCE

Mowing is performed once per year following the end of the rainy season. Pruning of tree branches or other vegetation management activities is performed as needed. If removal of some poplar trees is necessary, or if trees die over time, the trees may not be replaced. Vegetation maintenance is performed in accordance with the goal of maintaining the integrity of the final vegetated cover.

3.5 SURFACE SETTLEMENT MONITORING

The final cover is monitored for signs of differential settlement, which may cause ponding. Two existing survey monuments, Refinery Nos. 69 and 115, located on pile-supported structures adjacent to the Landfarms, were identified to serve as permanent survey control monuments. The current location of monument No. 115 is at the top of sphere base 1694 on Ammonia Street west of Toluene Street. Monument No. 69 is located on the top of the wall at the northwest corner of Bridge No. 162, which is north of the intersection of Channel Street and Petrolite Street. Settlement markers were installed within the final cover of the Landfarms to monitor settlement. Locations of the markers are shown on drawings D-767512-1 and D-767515-1 in Appendix A. The Landfarm surfaces are inspected and settlement markers surveyed on an annual basis for evidence of differential settlement. If differential settlement has occurred and the grades of the final cover will no longer prevent ponding in that area, the surface will be regraded to maintain positive drainage.

3.6 SOIL COVER INSPECTION AND MAINTENANCE PROGRAM

In addition to supporting the vegetation, the soil cover provides protection from wind and water erosion of the Landfarm soils. An annual inspection of the cover is performed by a qualified engineer prior to onset of the rainy season. The engineer identifies and recommends appropriate repairs for areas where the soil cover may have become eroded, affected by rodent burrows, or otherwise damaged, or where the paved areas have become damaged. Repairs are performed prior to the rainy season. Records of all inspections and repairs are maintained by the Refinery.

The cover will also be inspected after major rainfall events to identify areas where ponding or erosion may have occurred. Areas where ponding or erosion has occurred will be repaired to maintain positive drainage.

3.7 SURFACE DRAINAGE SYSTEM

The drainage swales and culverts are observed for cracking, clogging, erosion, and operating performance. The drainage control system is monitored annually before the beginning of the rainy season to ensure the surface drainage facilities are intact and clear of debris. The pumps are inspected and tested annually. After heavy rainfall, additional inspections are made to monitor their performance. If deficiencies are found, they will be corrected as soon as practicable.

3.8 FREE-PHASE HYDROCARBON MONITORING AND CONTAINMENT

The thickness of free-phase hydrocarbon, also referred to as light non-aqueous phase liquids (LNAPLs) in the existing monitoring wells is measured and reported as part of the Refinery-Wide Groundwater Monitoring Program (RGMP). The GPS recovers primarily groundwater, but also provides effective long-term containment for the migration of LNAPLs. The design of the GPS extraction system, with pumps located at roughly 200-foot intervals, is inherently redundant. Hence the malfunction of any one pump is not expected to reduce the effectiveness of the system at containing the LNAPLs within the Landfarms as the groundwater normally recovered by the malfunctioning pump would flow laterally towards the adjacent pumps. However, if the GPS as a whole were to be out-of-service for a period exceeding several days and temporary pumps could not be used to maintain drawdown in the extraction trenches, supplemental LNAPL recovery would be performed with vacuum trucks from the extraction sumps and monitoring wells whenever the measured thickness of LNAPL exceeded six inches. Recovery of LNAPLs encountered as part of the RGMP is evaluated as part of the Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan (URS, 2000).

3.9 GROUNDWATER QUALITY MONITORING PROGRAM

The Landfarm Post-Closure monitoring program is included as part of the groundwater monitoring program described in RWQCB Orders R2-2011-0036 and R2-2012-0015. In general, the portions of the monitoring program that apply to the Landfarms are designed to provide piezometric and chemical monitoring of the “A” and “C” Zones along the point of compliance. The point of compliance for the Landfarms closure units is the vertical surface located at the downgradient limit of the facility that generally coincides with the GPS.

As reported in previous RGMP reports, the “A” Zone has been historically impacted with petroleum hydrocarbons and metals. In response to this, Chevron has implemented the GPS, along the downgradient perimeter of the Refinery, as a corrective action on the “A” Zone groundwater. Because the GPS is a corrective action program, the updated RGMP for the “A” and portions of the “C” Zone not underlying the Landfarms will follow the corrective action monitoring program outlined in 22 CCR 66264.100, whereas monitoring of “C” Zone groundwater beneath the landfarms is a detection monitoring program under 22 CCR 66264.98.

The objective of “A” Zone piezometric monitoring is to demonstrate that a hydraulic barrier is maintained by the GPS at the perimeter of the closure units. Chemical monitoring in the “A” Zone supplements piezometric monitoring and assists in evaluating the effectiveness over time of the GPS corrective action. Chemical monitoring in the “C” Zone verifies that water quality below the Bay Mud at the point of compliance has not been degraded.

Because the GPS is a corrective action monitoring program, the constituents of concern (COC) in the “A” Zone groundwater may exceed background levels at some locations. In light of this condition, it is not practicable to rely on a comparison with background water quality as a measure

of effectiveness of corrective action. Rather, maximum allowable concentration limits (MACLs) have been established by the RWQCB as concentration limits against which GPS corrective action effectiveness will be evaluated.

As supported in RWQCB Orders R2-2011-0036 and R2-2012-0015, the MACLs are used to determine when compliance has been achieved by the GPS. In other words, the MACLs are cleanup goals for corrective action and exceedences may occur until the extraction system has had sufficient time to remediate groundwater in the vicinity.

If a chemical result from the "A" Zone exceeds the MACL and sufficient historical data are available, the results are further evaluated to identify if the concentration is "significant" compared with previous historical results. Statistical analyses of the current and historical analytical data of a particular well will then be used to evaluate concentrations that exceed the MACL.

To evaluate whether a release or degradation of groundwater has occurred, other criteria are used in conjunction with the analytical data, since concentrations exceeding an MACL alone would not be indicative of a significant release or necessarily pose an imminent threat to the waters of the State. The other criteria for evaluation of chemical data include GPS performance, location of the point of compliance well relative to the closure unit, Refinery operations that occurred in the area, and seasonal hydrogeologic conditions.

As discussed in the Closure Plan, there is no physical separation between the wastes in the Landfarms and the first underlying groundwater table, leaving no vadose zone to monitor for the migration of constituents. This condition has been historically recognized by Chevron and the various regulatory agencies. Therefore, no vadose zone monitoring is currently required, and no post-closure vadose zone monitoring will be performed.

3.10 COMPLETION OF POST-CLOSURE CARE CERTIFICATION SUBMITTAL

Pursuant to 22 CCR 66265.120, within 60 days of the completion of the established post-closure period, Chevron will submit to DTSC a certification that the post-closure care period for the Landfarms closure units was performed in accordance with this post-closure plan. The certification will be signed by Chevron and an independent Registered Professional Engineer. Documentation supporting the independent engineer's certification will be kept on site until Chevron is released from financial assurance requirements for post-closure care.

4.0 REFERENCES

Bechtel Environmental/Dames & Moore, 1996. *Revised Landfarms Closure Plan*, Waste Discharge Order Project, for Chevron Products Company. December 31, 1996.

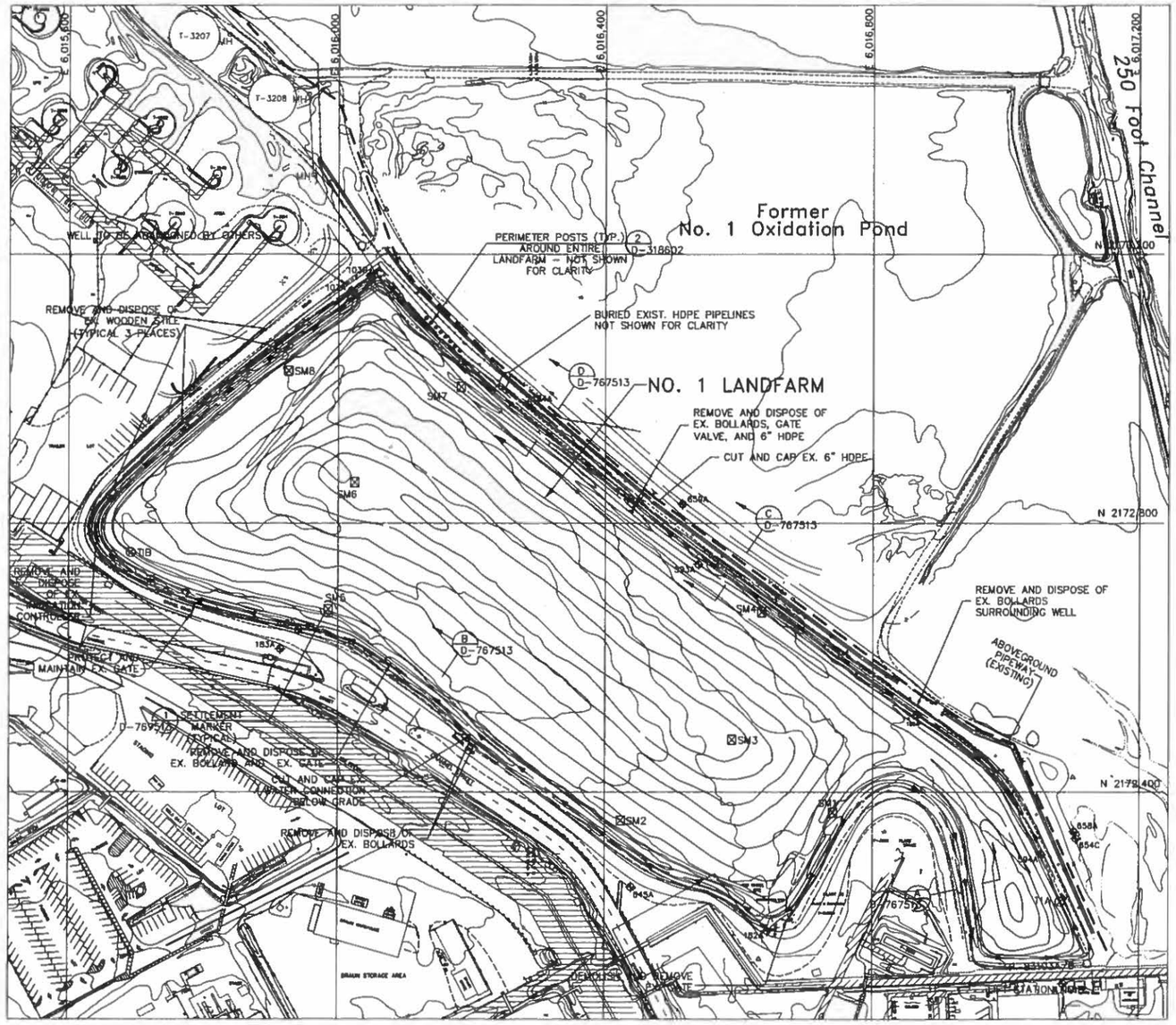
Bechtel Environmental/Dames & Moore, 1998. *Revised Landfarms Closure Monitoring Plan,* Chevron Products Company, Richmond, California. March 11, 1998.

Dames & Moore, 2000. *Revised Landfarms Closure Construction Completion Certification Report,* Waste Discharge Order Project, for Chevron Products Company. March 27, 2000.

URS, 2000. *Free Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, for Chevron Richmond Refinery,* December 20.

URS, 2002. *Revised Landfarms Post-Closure Monitoring Plan*, Chevron Products Company, Richmond California. January 7.

Appendix A:
As-Built Drawings of the Landfarm Closure Construction



SETTLEMENT MARKER LOCATION

ID	NORTHING	EASTING
SM1	2172370.02	6016741.13
SM2	2172357.91	6016423.56
SM3	2172478.08	6016590.09
SM4	2172668.33	6016634.56
SM5	2172672.11	6015985.62
SM6	2172860.94	6016024.76
SM7	2173002.96	6016183.78
SM8	2173027.68	6015927.79

TENSIOMETER LOCATION

ID	NORTHING	EASTING
T1A	2172237.46	6017081.94
T1B	2172756.88	6015693.07

NOTES:

1. EXISTING CONTOUR LINES ARE AT 1 FOOT INTERVALS BASED ON AERIAL PHOTOGRAPHS DATED AUGUST 1990.
2. LINES AND GRADES SHOWN ARE FINAL GRADES BASED ON AS-BUILT SURVEY DATED AUGUST 1999.
3. LINES AND GRADES SHOWN ARE FINAL GRADES.
4. CONTRACTOR WILL REMOVE EXISTING IRRIGATION SYSTEM PRIOR TO START OF WORK.
5. ANY WELLS WITHIN DISTURBED AREA OF LANDFARMS NOT LABELED "TO BE ABANDONED" SHALL BE RESTORED TO PREVIOUS CONDITION AS PER D-782119.

LEGEND:

- EXISTING OR PLANNED GPS EXTRACTION TRENCH
- EXISTING GROUNDWATER MONITORING WELL
- CENTERLINE OF PROPOSED DITCH
- DAYLIGHT LINE OF PROPOSED DITCH
- SM — SETTLEMENT MARKER LOCATION
- T1 — TENSIOMETER LOCATION
- AS-BUILT CONTOURS
- EXISTING CONTOURS

N

0 100
Scale In Feet

ABBREVIATIONS:

ø, DIA	DIAMETER
BGS	BELOW GROUND SURFACE
CLR	CLEARANCE
CMP	CORRUGATED METAL PIPE
CSP	CARBON STEEL PIPE
CY	CUBIC YARDS
DWOP	DEEP WATER OUTFALL PROJECT
E	EAST
EF	EACH FACE
EL	ELEVATION
EW	EACH WAY
EX	EXISTING
EWEF	EACH WAY, EACH FACE
HDPE	HIGH DENSITY POLYETHYLENE
MAX.	MAXIMUM
MIN.	MINIMUM
IE.	INVERT ELEVATION
INV	INVERT
LF	LINEAL FOOT
NO.	NUMBER
N	NORTH
O.C.	ON CENTER
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
SCH	SCHEDULE
STA	STATION
TAN	TANGENT
TYP	TYPICAL
U.V.	ULTRA-VIOLET

REGISTERED PROFESSIONAL ENGINEER
THOMAS M. SHEET
No. C 58265
EXP.
CIVIL
STATE OF CALIFORNIA

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REFERENCE DRAWINGS

NO. 1 LANDFARM – SECTIONS	D-767513
NO. 1 LANDFARM – DITCH PLAN	D-767514
NO. 1 LANDFARM – IRRIGATION PLAN	D-318600
EXTRACTION WELLS & MONITORING WELLS DETAILS	D-782119

REVISIONS

0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS-BUILT	9/15/98	SLD

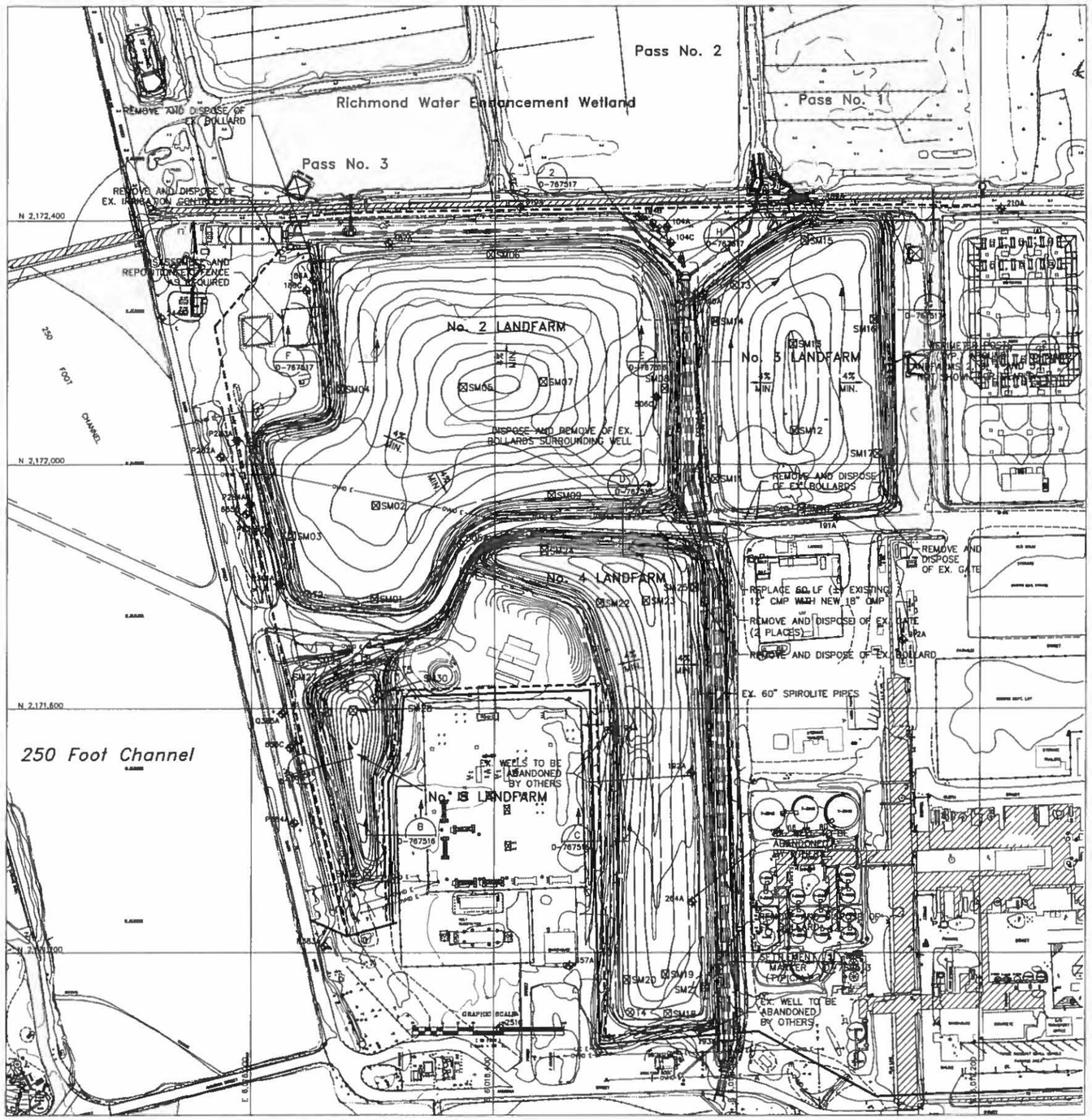
Xref cdflogo.dwg

09/28/99 13

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE APPROVED
ENGR. ENGR. DEPT.
DFR'G. DEPT.

GRADING PLAN
FINISHED GRADING - SECTOR 83 NO. 1 LANDFARM
ENVIRONMENTAL CONTROL GENERAL
UTILITIES & ENVIRONMENTAL AREA BUSINESS UNIT

S W. O. S. O. D-767512-1



SETTLEMENT MARKER LOCATION

AREA LOCATION	ID	NORTHING	EASTING
NO. 2 LANDFARM	SM01	2171780.12	6018201.83
	SM02	2171933.20	6018204.05
	SM03	2171883.53	6018065.66
	SM04	2172124.17	6018144.85
	SM05	2172127.24	6018348.05
	SM06	2172340.12	6018400.02
	SM07	2172133.11	6018466.16
	SM08	2172124.79	6018679.29
	SM09	2171950.04	6018494.27
NO. 3 LANDFARM	SM10	2171927.97	6018904.04
	SM11	2171976.81	6018762.10
	SM12	2172056.32	6018891.97
	SM13	2172198.10	6018890.01
	SM14	2172234.96	6018762.38
	SM15	2172367.19	6018909.27
	SM16	2172238.02	6019022.96
	SM17	2172018.19	6019028.89
NO. 4 LANDFARM	SM18	2171099.80	6018686.95
	SM19	2171164.75	6018683.06
	SM20	2171156.15	6018619.09
	SM21	2171143.96	6018748.43
	SM22	2171773.11	6018574.23
	SM23	2171777.05	6018648.91
	SM24	2171859.13	6018482.19
	SM25	2171798.88	6018729.02
NO. 5 LANDFARM	SM26	2171330.00	6018191.89
	SM27	2171594.20	6018124.60
	SM28	2171597.32	6018166.86
	SM29	2171637.08	6018153.07
	SM30	2171622.99	6018215.01

TENSIOMETER LOCATION

AREA LOCATION	ID	NORTHING	EASTING
NO. 2 LANDFARM	T2	2171787.15	6018090.84
NO. 3 LANDFARM	T3	2172294.18	6018793.65
NO. 4 LANDFARM	T4	2171102.42	6018624.89
NO. 5 LANDFARM	T5	2171616.16	6018201.85

NOTES:

1. EXISTING CONTOUR LINES ARE AT 1 FOOT INTERVALS BASED ON AERIAL PHOTOGRAPHS DATED AUGUST 1990.
2. LINES AND GRADES SHOWN ARE FINAL GRADES AT 1 FOOT INTERVALS BASED ON AS-BUILT SURVEY DATED AUGUST 1999.
3. CONTRACTOR WILL REMOVE EXISTING IRRIGATION SYSTEM PRIOR TO START OF WORK.
4. ANY WELLS WITHIN DISTURBED AREA OF LANDFARMS NOT LABELED "TO BE ABANDONED" SHALL BE RESTORED TO PREVIOUS CONDITION AS PER D-782119.
5. EXISTING CONTOURS SHOWN ARE NOT VALID IN NORTHERN PORTION OF NO. 4 LANDFARM DUE TO PLACEMENT OF EXCESS FILL. MATERIAL CAN BE USED AS GENERAL BACKFILL, AFTER PROCESSING TO CONFORM TO PROJECT SPECIFICATIONS.
6. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND ELECTRICAL LINES.

LEGEND:

- EXISTING GPS EXTRACTION TRENCH
- EXISTING GPS BARRIER WALL
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING GROUNDWATER MONITORING WELL
- PROPOSED STORM DRAINAGE PIPE
- DAYLIGHT LINE OF PROPSED DITCH
- SM — SETTLEMENT MARKER LOCATION
- T2 — TENSIOMETER LOCATION
- EXISTING CONTOURS
- AS-BUILT CONTOURS

N

0 100
Scale in Feet

REGISTERED PROFESSIONAL ENGINEER THOMAS M. SHEET No. C 58265 EXP. CIVIL STATE OF CALIFORNIA

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REFERENCE DRAWINGS

NO. 2 THROUGH 5 LANDFARM	SECTIONS	D 767516
NO. 2 THROUGH 5 LANDFARMS	SECTIONS	D 767517
NO. 2 THROUGH 5 LANDFARMS	DITCH PLAN	D 767518
NO. 2 THROUGH 5 LANDFARMS	IRRIGATION PLAN	D 318601
EXTRACTION WELLS & MONITORING WELLS DETAILS		D 782119

REVISIONS

0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

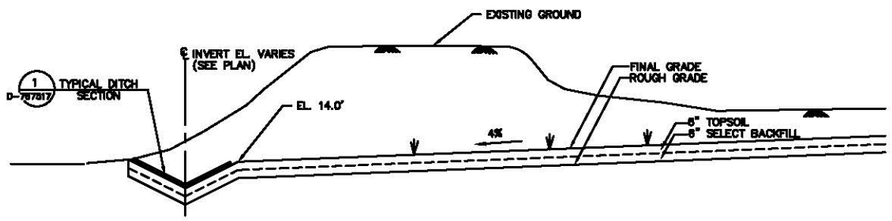
Xref: cdflogo.dwg

09/28/99 SLD

SCALE AS NOTED DR. C. KOSSA DR. APP. ____ DATE ____ APPROVED
ENGR. ____ ENGR. DEPT. ____
OPR'G. DEPT ____

GRADING PLAN
FINISHED GRADING - SECTOR 83 NO. 2-5 LANDFARMS
ENVIRONMENTAL CONTROL GENERAL
UTILITIES & ENVIRONMENTAL AREA BUSINESS UNIT

S V. O. ____ S. O. ____ D-767515-1

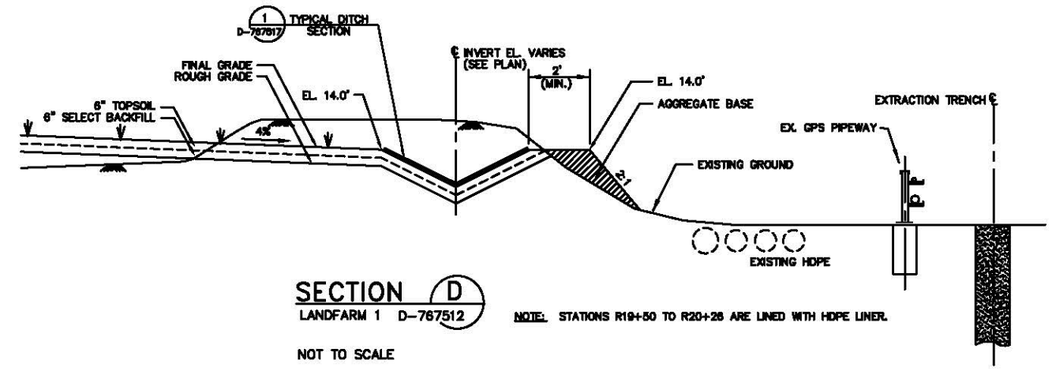


TYPICAL SECTION A

LANDFARM 1 D-767512

STA L0+00 TO STA L2+75
STA R0+00 TO STA R5+25

NOT TO SCALE

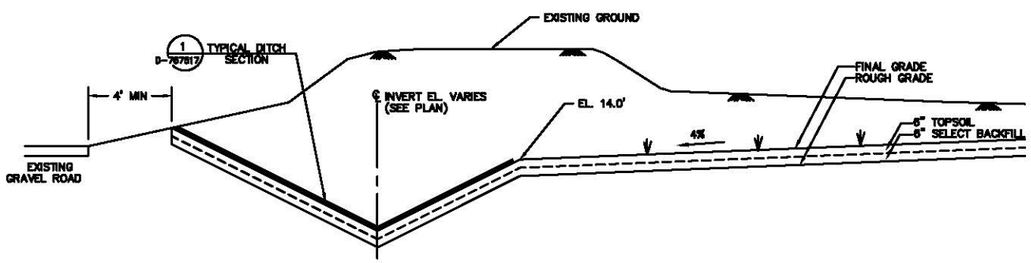


SECTION D

LANDFARM 1 D-767512

NOTE: STATIONS R19+50 TO R20+26 ARE LINED WITH HDPE LINER.

NOT TO SCALE



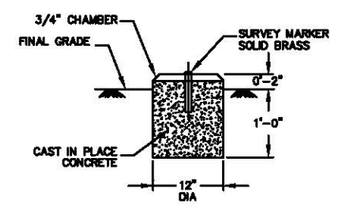
TYPICAL SECTION B

LANDFARM 1 D-767512

STA L2+75 TO L20+36

NOTE: STATIONS L15+00 TO L20+36 ARE LINED WITH HDPE LINER INSTEAD OF CURLEX.
STATIONS L2+75 TO L15+00 CONFORM TO THE TYPICAL DITCH SECTION.

NOT TO SCALE

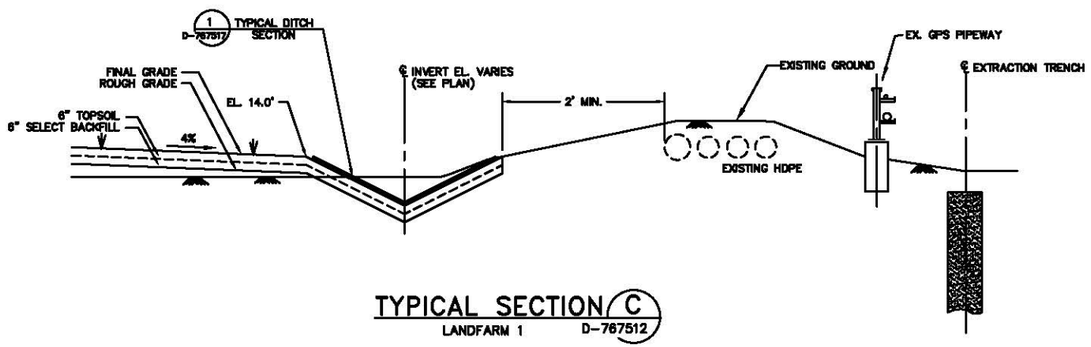


SEE NOTES 1 AND 2.

DETAIL 1 / 1

SETTLEMENT MARKER D-767512 / D-767515

NOT TO SCALE



TYPICAL SECTION C

LANDFARM 1 D-767512

STA R5+25 TO R16+50

NOT TO SCALE

NOTES:

1. FOR SETTLEMENT MARKER LOCATIONS SEE SETTLEMENT MARKER TABLES, DRAWING D-767512 AND D-767515
2. CONTRACTOR SHALL LABEL EACH SETTLEMENT MARKER WITH CORRESPONDING NUMBER AS SHOWN ON PLAN VIEWS. NUMBER SHALL BE STAMPED INTO TOP OF BRASS SURVEY MARKER.

REGISTERED PROFESSIONAL ENGINEER THOMAS M. SHEET No. C 58265 EXP. CIVIL STATE OF CALIFORNIA

THIS IS AN AUTOCAD DRAWING. DO NOT REVISE MANUALLY.

REFERENCE DRAWINGS		
NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512	
NO. 1 LANDFARM – DITCH PLAN	D-767514	
NO. 1 LANDFARM – IRRIGATION PLAN	D-318600	

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/98	SLD

Xref: ntlogo.dwg

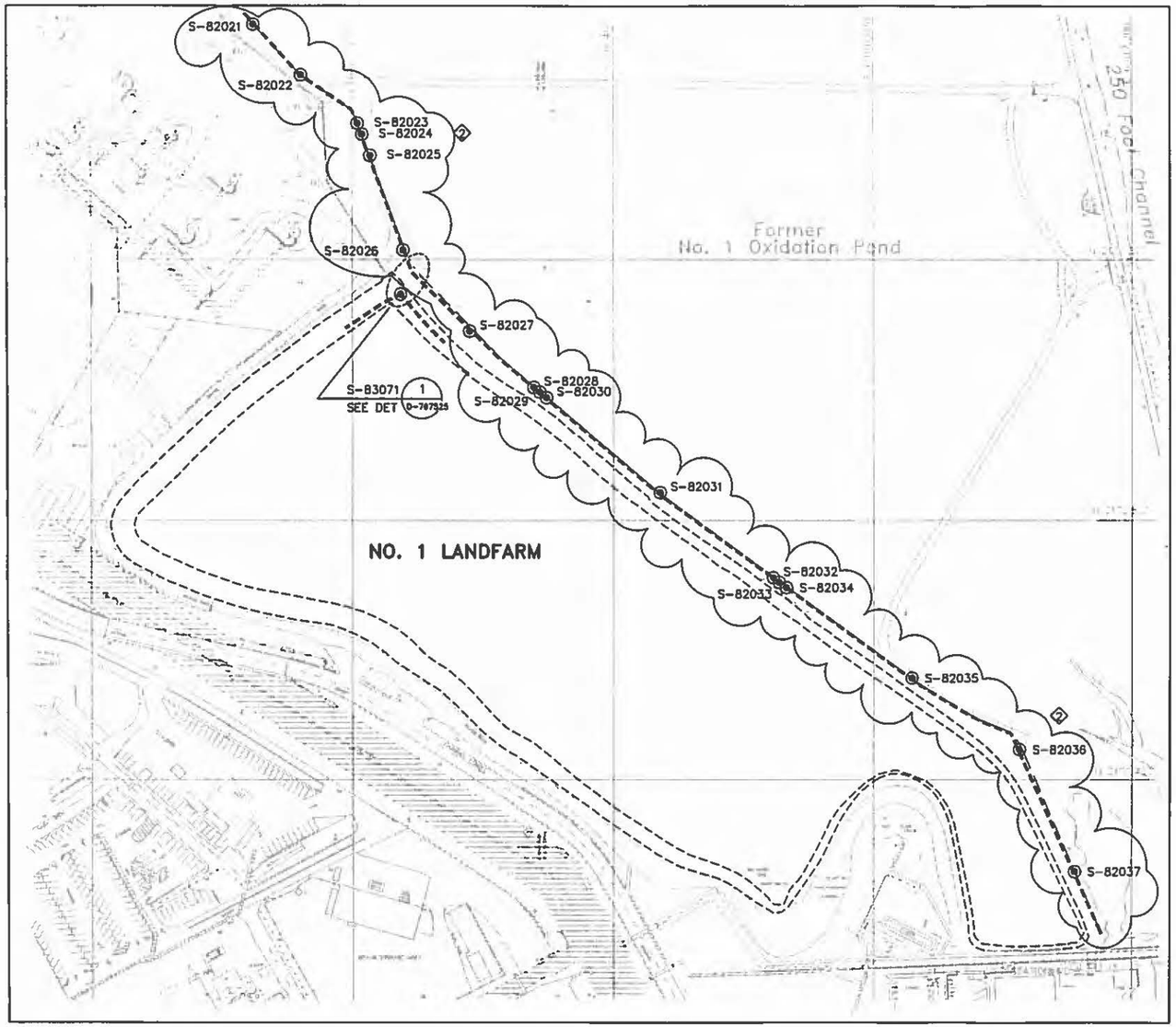
09/28/99 EB

SCALE AS SHOWN DR. RLS DR. APP. DATE APPROVED
ENGR. ENGR. DEPT.
OPR'S. DEPT.

SECTIONS
NO. 1 LANDFARM – SECTOR 83 LANDFARMS
ENVIRONMENTAL CONTROL GENERAL
UTILITIES & ENVIRONMENTAL AREA BUSINESS UNIT

A V.O. S.O. D-767513-1

Appendix B:
As-Built Drawings of the Landfarm Groundwater Protection System – Shallow Extraction Trenches and Extraction Sumps



NOTES:

1. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
2. LOCATION OF EXISTING GPS TRENCHES ARE APPROXIMATE.

ABBREVIATIONS:

ø, DIA	DIAMETER
BGS	BELOW GROUND SURFACE
CS	CARBON STEEL
CY	CUBIC YARDS
E	EAST
EF	EACH FACE
EL	ELEVATION
EOR	EDGE OF ROAD
EX	EXISTING
EWEF	EACH WAY, EACH FACE
GALV.	GALVANIZED
GPS	GROUNDWATER PROTECTION SYSTEM
HDPE	HIGH DENSITY POLYETHYLENE
MAX.	MAXIMUM
MIN.	MINIMUM
IE.	INVERT ELEVATION
INV	INVERT
LF	LINEAL FOOT
NO.	NUMBER
N	NORTH
O.C.	ON CENTER
SCH	SCHEDULE
SD	STORM DRAIN LINES
SS	STAINLESS STEEL
STA	STATION
TYP	TYPICAL

LEGEND:

- EXISTING GPS EXTRACTION TRENCH
- DAYLIGHT LINE OF EXISTING V-DITCH
- EXISTING SUMP / NEW PUMP LOCATION

N

0 100
Scale in Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512
NO. 1 LANDFARM – DITCH PLAN	D-767514

REVISIONS			
0 ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	2 ADD EXTRACTION TRENCH AND SUMPS 3/01/00	SLD
1 AS-BUILT 9/15/99	AGF		

Chevron
Richmond Refinery

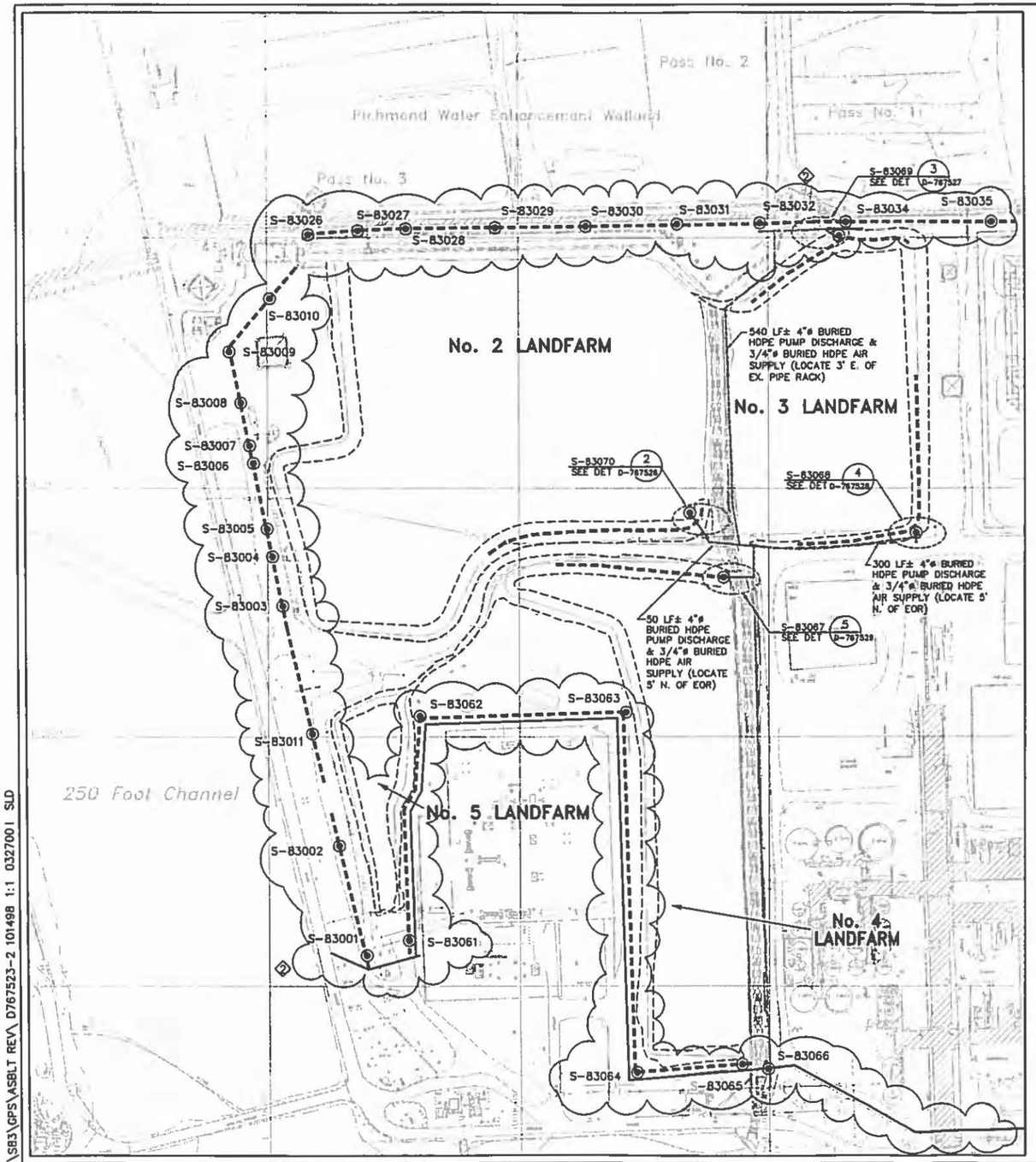
SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

JOB SLD

NO. 1 LANDFARM–GPS PUMP LOCATIONS
SECTOR B3: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767522-2

42100001\CHEV_R\SB3\GPS\ASBUILT REV\ D767522-2091798 1:1 030100 H SLD



NOTES:

1. SEE DETAILS FOR PIPE LENGTHS IN VICINITY OF SUMPS.
2. HDPE PUMP DISCHARGE LINE OVER 100 LINEAL FEET IN LENGTH SHALL HAVE A FLANGED SECTION AT LEAST EVERY 100 LINEAL FEET.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EXISTING GPS EXTRACTION TRENCH
- DAYLIGHT LINE OF EXISTING V-DITCH
- EXISTING SUMP / NEW PUMP LOCATION
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING UNDERGROUND ELECTRICAL LINE
- BARRIER WALL

REGISTERED PROFESSIONAL ENGINEER THOMAS M. BRETT No. C 61862 EXP. 6-30-02 CIVIL STATE OF CALIFORNIA

N

0 100
Scale in Feet

Waste Discharge Order Project
DCM GROUP
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

NO. 2 THROUGH 5 LANDFARMS - FINISHED GRADING PLAN	D-767515
NO. 2 THROUGH 5 LANDFARMS - DITCH PLAN	D-767518

REVISIONS

0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1	AS-BUILT 9/15/99	AGF	
2	ADD EXTRACTION SUMPS AND BARRIER WALL 3/24/00	SLD	

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998
ENGR. ENGR. DEPT.
OPR'G. DEPT.
APPROVED

NO.2 THROUGH 5 LANDFARMS - GPS PUMP LOCATIONS
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767523-2

0327001 SLD

42100001\CHEV_R\S83\GPS\ASBLT REV\ D767523-2 101498 1:1 0327001 SLD

Appendix L
Regional Water Quality Control Board Orders

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

REVISED SELF-MONITORING AND REPORTING PROGRAM

FOR

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

ORDER NO. R2-2011-0036

CONSISTS OF PART A AND PART B

Revised January 22, 2014

PART A

This combined Self-Monitoring Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs) and Site Cleanup Requirements (SCRs), including:

a) General monitoring requirements for landfills and waste management units under the WDRs (Part A);
b) General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
c) Self-monitoring report content and format (Part A);
d) Self-monitoring report submittal frequency and schedule (Part B);
e) Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
f) Monitoring locations, parameters, analytes and frequency for programs under the SCRs (Part B).

A. AUTHORITY AND PURPOSE

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations (CCR), Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, sections 20380 through 20435. The principal purposes of an SMP include: 1) to document compliance with WDRs and prohibitions established by the Regional Water Board, 2) to facilitate self-policing by the discharger in the prevention and abatement of pollution arising from the waste discharge, 3) to develop or assist in the development of effluent standards of performance and toxicity standards, and 4) to assist the discharger in complying with the requirements of Title 27. Additionally, under California Water Code (CWC) section 13304, Chevron is required to implement corrective actions and monitor the effectiveness of the implemented corrective actions under this combined SMP.

B. MONITORING REQUIREMENTS

Monitoring refers to the observation, inspection, measurement, and/or sampling of environmental media, waste management units (WMUs), containment and control facilities, and waste disposed in each WMU. The monitoring programs designed to evaluate the potential release of wastes from WMUs are included in the WDRs Monitoring Program described in this combined SMP. Monitoring programs designed to evaluate the effectiveness of corrective actions implemented under CWC section 13304 are also described in the combined SMP. The following defines the types of monitoring that may be required.

Monitoring of Environmental Media

The Regional Water Board may require monitoring of groundwater, surface water, vadose zone, stormwater, leachate, and any other environmental media that may pose a threat to water quality or provide an indication of a water quality threat at the refinery.

Sample collection, storage, and analyses shall be performed according to the most recent version of U.S. EPA-approved methods or in accordance with Groundwater Monitoring Program Standard Operating Procedures (SOP) or subsequent revisions approved by Regional Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a California State-approved laboratory for the required analyses. The director of the laboratory whose name appears on the certification shall be responsible for supervising all analytical work in his/her laboratory and shall have signing authority for all laboratory data reports or may designate signing of all such data

included in reports submitted to the Regional Water Board.

All monitoring instruments and devices used to conduct monitoring in accordance with this SMP shall be maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once every two years.

Receiving waters refer to any surface water which actually or potentially receives surface or groundwater that pass over, through, or under waste materials or impacted soils. In this case, the groundwater beneath and adjacent to the WMU areas and the surface runoff from the refinery site are considered receiving waters.

Standard Observations

Standard observations refer to observations within the limits of each WMU, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

1. Waste Management Units:
   a. Evidence of ponded water at any point on the WMU;
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

2. Perimeter of Waste Management Units:
   a. Evidence of liquid leaving or entering the WMU, estimated size of affected area and flow rate (show affected area on map);
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

3. Receiving Waters:
   a. Floating and suspended materials of waste origin, including their presence or absence, source, and size of affected area;
   b. Discoloration and turbidity: description of color, source, and size of affected area;
   c. Evidence of odors, presence or absence, characterization, source, and distance of travel form source;
   d. Evidence of beneficial use, such as presence of water associated with wildlife;
   e. Estimated flow rate; and
   f. Weather conditions, such as estimated wind direction and velocity, total precipitation.

Facilities Inspections

Facilities inspections refer to the inspection of all containment and control structures and devices associated with the environmental monitoring of the refinery. Containment and control facilities may include the following:

1. Intermediate and final covers; and

2. Stormwater management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks.

Quality Assurance/Quality Control (QA/QC) Sample Monitoring

Chevron shall collect duplicate, field blank, equipment blank (if appropriate) and trip blank samples for each monitoring event at the frequency specified in the latest version of the Groundwater Monitoring Program SOP.

C. REPORTING REQUIREMENTS

Reporting responsibilities of waste dischargers under WDRs and SCRs are specified in CWC sections 13225(a), 13267(b), 13383, and 13387(b) and this Regional Water Board's Resolution No.73-16 and Title 27. At a minimum, each Self-Monitoring Report (SMR) shall include the following information:

1. Transmittal Letter: A cover letter transmitting the essential points of the monitoring report shall be included with each monitoring report. The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

2. Graphic Presentation: The following maps, figures, and graphs (if applicable) shall be included in each SMR to visually present data collected pursuant to this SMP:
   a. Plan-view maps showing all monitoring and sampling locations, WMUs, containment and control structures, treatment facilities, surface water bodies, and site/property boundaries;
   b. Groundwater level/piezometric surface contour maps for each groundwater-bearing zone of interest showing inferred groundwater gradients and flow directions under/around each WMU, based upon the past and present water level elevations and pertinent visual observations; and
   c. Any other maps, figures, photographs, cross-sections, graphs, and charts necessary to visually demonstrate the appropriateness and effectiveness of sampling, monitoring, characterization, investigation, or remediation activities relative to the goals of this SMP.

3. Tabular Presentation: The following data (if applicable) shall be presented in tabular form and included in each SMR to show a chronological history and allow quick and easy reference:
   a. Well designation;
   b. Well location coordinates (latitude and longitude);
   c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
   d. Groundwater depths;
   e. Groundwater elevations;
   f. Current analytical results (including analytical method and detection limits for each constituent);
   g. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
   h. Measurement dates.

4. Compliance Evaluation Summary and Discussion:

a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections;
b. The quantity and types of wastes captured by the GPS and hydrocarbon recovery program, and the location these wastes were disposed of during the reporting period, if applicable;
c. A description of the waste stream, if applicable;
d. The signature of the laboratory director or his/her designee in laboratory data deliverables indicating that he/she has supervised all analytical work in his/her laboratory; and
e. A discussion of the field and laboratory results that includes the following information:

(1) Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
(2) Conclusions;
(3) Recommendations;
(4) Newly implemented or planned investigations and remedial measures;
(5) Data anomalies;
(6) Variations from protocols;
(7) Condition of wells; and
(8) Effectiveness of leachate monitoring and control facilities.

5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Regional Water Board staff and unless the information is already contained in an SAP or SOP approved by Regional Water Board staff:

a. New boring and well logs;
b. Method and time of water level measurements;
c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and electrical conductivity, calibration of the field equipment, pH temperature, conductivity, and turbidity measurements, and method of disposing of the purge water;
d. Sampling procedures, field, equipment, and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name of the person actually taking the samples, and any other relevant observations; and
e. Documentation of laboratory results, analytical methods, detection limits and reporting limits, and Quality Assurance/Quality Control (QA/QC) procedures for the required sampling.

D. ANNUAL REPORTING

The Discharger shall submit an annual self-monitoring report to the Regional Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information for each monitoring event during the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

1. **Graphic Presentation**
Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

a. Known or probable contaminant sources;
b. Well locations;
c. Groundwater elevation contours;
d. Inferred groundwater flow direction(s);
e. Identify wells containing phase-separated product;
f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
g. Appropriate analytical results.

Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:

i. Vertical and lateral extent of contamination;
ii. Contaminant sources;
iii. Geologic structures;
iv. Soil lithology;
v. Water table/piezometric surfaces;
vi. Sample locations;
vii. Sample analytical results; and
viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

2. **Tabular Presentation**
Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

a. Well designations;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths;
e. Groundwater elevations;
f. Horizontal groundwater gradients;
g. Vertical groundwater gradients (including comparison wells from different zones);
h. Phase-separated product elevations;
i. Phase-separated product thickness;
j. Current analytical results (including analytical method and detection limits for each constituent);
k. Historical analytical results for the most recent four sampling events;
l. Measurement dates;
m. Groundwater extraction, including:
    i. Average daily extraction rate;
    ii. Total volume extracted for monitoring period;
    iii. Annual cumulative total volume extracted; and
n. Estimate of contaminant volume extracted (reported in gallons) including:
    i. Average daily removal rate;
    ii. Total volume removed for monitoring period;
    iii. Annual cumulative total volume removed.

3. **Discussion**
   Provide a discussion of the field and laboratory results that includes the following information:

   a. Data Interpretations;
   b. Conclusions;
   c. Recommendations;
   d. Newly implemented or planned investigations and remedial measures;
   e. Data anomalies;
   f. Variations from protocols; and
   g. Conditions of wells.

E. CONTINGENGY REPORTING

1. The Discharger shall report any seepage from the surface of any WMU or discharge prohibited in the WDRs or SCRs immediately after it is discovered to the Regional Water Board by calling the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov. The Discharger shall submit a written report with the Regional Water Board within five days of discovery of any discharge. The written report shall contain, at a minimum, the following information:

   a. A map showing the location(s) of discharge;
   b. Approximate flow rate;
   c. A description of the nature of the discharge; and
   d. Corrective measures underway or proposed.

2. The Discharger shall submit a written report to the Regional Water Board within seven working days of determining that a statistically significant difference occurred in the sample result compared against the historical dataset and above an approved WQPS in a perimeter segment-monitoring well. In addition, evaluation of GPS performance will be reviewed to examine the effectiveness of hydraulic control.

   a. Chevron shall immediately re-sample at the compliance point where the exceedance was observed, evaluate the result against the historical dataset and re-analyze if results are not consistent with historical trends.

   b. If re-sampling and analysis confirm the exceedance through statistical analysis, Chevron shall document this in the text of the next Annual Report and notify the Regional Water Board in writing within 21 days of re-sampling. In this letter, Chevron shall evaluate whether any re-sampling or additional corrective measures need to be implemented.

F. ELECTRONIC REPORTING

1. **Geotracker Requirements**
   The State Water Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:

   http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically to Geotracker:

a. Groundwater analytical data;
b. Surveyed locations of monitoring wells;
c. Boring logs describing monitoring well construction; and
d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

2. **Data Tables**
Upon request, monitoring results shall also be provided electronically in Microsoft Excel@ or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report.
Electronic tables shall include the following information:

a. Well designations;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths and elevations (water levels);
e. Phase-separated product thicknesses and elevations;
f. Current analytical results by constituent of concern (including detection limits for each constituent);
g. Historical analytical results (including the past four sampling events); and
h. Measurement dates.

G. MAINTENANCE OF WRITTEN RECORDS

The Discharger shall maintain information required pursuant to this SMP for a minimum of five years. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board.

PART B: MONITORING AND OBSERVATION SCHEDULE

1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS

A. GROUNDWATER MONITORING:

Semi-Annual Reports: **Due August 31 and March 1 of each year**
Annual Report: **Due March 1 of each year**

Groundwater shall be sampled and analyzed as detailed in Tables 2 and 4. Monitoring well locations are listed in Tables 1 and 3. All quarterly, semi-annual, annual, biennial and 5-year monitoring cycles referenced in Tables 2 and 4 are to commence with the monitoring report due on August 1, 2014. Groundwater analyses shall include the following field measurements: pH, temperature, specific conductance, water level, volume purged, number of casings volumes purged, and whether the well went dry during sampling (including measures taken to ensure accuracy of analyses given this condition). Groundwater monitoring wells installed in the future will be sampled and analyzed as detailed in Tables 2 and 4 and on a quarterly basis until a statistically significant dataset is established.

B. FACILITIES MONITORING - **Observe quarterly, report semi-annually**

Semi-Annual Report: **Due August 31 and March 1 of each year**
Annual Report: **Due March 1 of each year**

The Discharger shall inspect all facilities to ensure proper and safe operation and report semi-annually. The facilities to be monitored shall include, but not be limited to:

1. Waste Containment systems;
2. Waste treatment systems;
3. Surface water retention basins;
4. Leak detection systems (where applicable); and
5. Leachate/groundwater management facilities and secondary containment where applicable.

2. GPS PERFORMANCE MONITORING

Chevron shall measure the water level in each GPS corrective action monitoring well and in a sufficient number of wells or piezometers both upgadient and downgradient of the GPS to demonstrate continuous maintenance of a hydraulic depression in the GPS trenches (inward hydraulic gradient). To demonstrate the effectiveness of the GPS, Chevron shall include the following for each refinery sector in the semi-annual SMRs:

a. contour maps of 1st and 3rd quarter GPS groundwater elevation data;
b. hydrographs showing water level data (measured at least once per week) at each operating extraction sump or recovery well;

c. a narrative summary of the GPS performance during the reporting period; and,
d. an estimate of the volume of groundwater extracted during the reporting period.

3. ON-SITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING

Closed WMUs (Plant l/Additives Plant, Landfill 15, Landfarms 1-5, the Hydropits, Parr-Richmond Landfill and the Gertrude Street Site) shall be inspected annually by a registered California engineer or geologist prior to the onset of the rainy season. These annual inspections shall include identification of areas of the final covers where the soil has become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Chevron shall perform appropriate repairs for these areas prior to the rainy season. In addition, Chevron shall monitor runoff/run-on control facilities for their effectiveness and overall condition as needed according to weather conditions during the winter months (November through April) and as prescribed in the approved post-closure maintenance/monitoring plan for each individual WMU. Chevron shall maintain records of all inspections and repairs and summarize in each semi-annual monitoring report any repairs made during the corresponding reporting period.

4. ALKANE PLANT PLUME REMEDIATION MONITORING

Chevron shall continue to monitor the Alkane Plant Plume remediation effort in accordance with *the Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001). The monitoring components of this plan include measuring potentiometric water levels, liquid hydrocarbon thickness, and benzene and fluoride concentrations. Benzene and fluoride concentrations will continue to be measured annually in samples collected from 6 wells (listed in Table 1), located around the perimeter of the plume to verify containment of the plume.

5. FREE-PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY

Chevron shall include a map in each semi-annual SMR that shows the locations of all wells within the refinery that contain FPLH. The measured thickness of the FPLH in each well should be indicated on the map next to the well. Recovery of FLPH will be performed in accordance with the procedures described in the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery* (URS, 2000). In addition, the SMR shall include a description of FPLH recovery method used, recovery volume data for the reporting period and cumulative recovery data for each active recovery well or system.

6. <u>CHEMICAL CONSTITUENT MONITORING</u>

a. <u>Refinery-Wide Groundwater Monitoring Program</u>: Chevron shall sample the Refinery-Wide Corrective Action Groundwater Monitoring Program compliance monitoring points listed in Table 1 for the analytical parameters and at the frequencies listed in Table 2. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

b. <u>Landfarm Post-Closure Monitoring Program</u>: Chevron shall sample the Landfarms Post-Closure Monitoring Program monitoring points listed in Table 3 for the analytical parameters and at the frequencies listed in Table 4. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure. Monitoring events for

constituents of concern and Appendix IX analyses shall alternate between periods of highest and lowest groundwater levels.

c. Chevron shall sample new wells installed to monitor Landfarms 1 through 5 for COCs and MPs listed in Table 4 over eight consecutive quarters. Within the first year after installation, Chevron shall analyze new wells for the Appendix IX constituents listed in Table 4. Chevron shall add any new compounds detected in new wells to the list of COCs in Table 4.

d. Chevron shall sample the monitoring points listed in Table 3 regardless of the presence of nonaqueous phase liquid as follows:

   i. For monitoring points with persistent nonaqueous phase liquid (e.g., more than two consecutive quarters), Chevron shall collect samples every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent nonaqueous phase liquid (e.g., not detected during consecutive quarters), Chevron shall collect samples semi-annually.

   ii. Chevron shall obtain samples for dissolved phase analysis after purging nonaqueous phase liquid from the well, by low-flow sampling, or by another appropriate method.

   iii. Chevron shall follow the most recent version of the Chevron Groundwater Monitoring Program Standard Operating Procedure.

e. Chevron shall monitor “A” Zone monitoring points in Table 3 under a corrective action monitoring program (22 CCR 66264.100).

f. Chevron shall monitor “C” Zone monitoring points in Table 3 under a detection monitoring program (22 CCR 66264.98).

Attachments:

Table 1:	List of Monitoring Wells by Sector, Refinery-Wide Groundwater Monitoring Program
Table 2:	Maximum Allowable Concentration Limits for Constituents of Concern and Monitoring Parameters for the Refinery-Wide Groundwater Monitoring Program
Table 3:	Landfarm Area Monitoring Well Network
Table 4:	Landfarm Post-Closure Monitoring Program, Monitoring Parameters, Constituents of Concern and MACLs

Table 1: List of Monitoring Wells by Sector
Refinery-Wide Groundwater Monitoring Program
Chevron Richmond Refinery

Alkane Sector	Castro and Plant 1/Add. Sector	Landfarms /Landfill 15 Sector	North Yard Sector	Reclamation Yard Sector	Pollard Sector	Effluent Sector	Bayside North	Bayside South	Interior "C" Zone
209A	323A	232A	675A	290A	260A	108A	387AT	351CT	208C
P460A	642A	233A	550A	643A	262A	164A	388AT	345AT	638C
595AT	554A	234A	377C	370A	803A	179A	390AT	340AT	378C
223C	556A	240A	178C	560A	635C	108C	391AT	337F	379C
375C	106C		671A	685C		164C			380C
670C	125C	551A		238C					138C
167A*	320C	552A		369S					382C
170A*	649A	232C		564A					
174A*		234C		569C					
200A*		235C							
201A*		236C							
258A*									

Notes:
* Wells associated with Alkane Plant Plume Remediation Monitoring

Table 2: Maximum Allowable Concentration Levels (MACLS) for Constituents of Concern and Monitoring Parameters for the Chevron Refinery -Wide Groundwater Monitoring Program

Constituents of concern	MACL (µg/l)	MACL SOURCE	Landfarms/landfill 15 Sector	Castro/Plant 1 Add. Sector	North Yard Sector	Bayside North	Bayside south	Alkane Sector	Effluent Sector	Reclamation Yard Sector	Pollard Sector	Interior "C" zone
TPH-Gas	500	F4a	A	A	A	A	A[3]	A	A	B[2]	A	A
TPH- Diesel	640	F4a	A[6]	A[2]	A[7]	A[8]	A[3]	A	A[9]	B[2]		A
TPH- Diesel silica gel	640	F4a	A[6]	A[2]	A[7]	A[8]	A[3]	A	A[9]	B[2]		A
Benzene	46	F4a	A	A	A	A	A[3]	A	A	B[2]	5	A
MTBE	8000	F4a	A	A	A	A	A[3]	A	A	B[2]	5	A
Acenaphthene	23	F4a	5	5	5	5	5	5	5	5	5	
Acenaphthylene	30	F4a	5	5	5	5	5	5	5	5	5	
Anthracene	0.73	F4a	5	5	5	5	5	5	5	5	5	
Benzo(a)pyrene	0.014	F4a	5	5	5	5	5	5	5	5	5	
Benzo(b)fluoranthene	0.049	F4d	5	5	5	5	5	5	5	5	5	
Benzo(g,h,i)perylene	0.1	F4a	5	5	5	5	5	5	5	5	5	
Benzo(k)fluoranthene	0.049	F4d	5	5	5	5	5	5	5	5	5	
Chrysene	0.049	F4d	5	5	5	5	5	5	5	5	5	
Dibenzo(a,h)anthracene	0.049	F4d	5	5	5	5	5	5	5	5	5	
Fluoranthene	8	F4a	5	5	5	5	5	5	5	5	5	
Fluorene	3.9	F4a	5	5	5	5	5	5	5	5	5	
Indeno(1,2,3-cd)pyrene	0.049	F4d	5	5	5	5	5	5	5	5	5	
Naphthalene	24	F4a	5	5	5	5	5	5	5	5	5	
Phenanthrene	4.6	F4a	5	5	5	5	5	5	5	5	5	
Pyrene	2	F4a	5	5	5	5	5	5	5	5	5	
Chlordane	0.00059	F4d		5						5		
G-BHC (Lindane)	0.016	F4a		5						5		
Dieldrin	0.00014	F4d		5						5		
Selenium	14 A Zone 17 C Zone	(1)	5	5	5			5	5	5	B	
Arsenic	36	F4a	A[6]	5[1]					5	A		
Cadmium	3.2 A Zone 8.2 C Zone	(1)	5[3]	5	5			5	5	5	A	5
Chromium VI	11	F4a	5	5	5[4]			5	5	5	5	5
Lead	2.5	F4a	A	A	A	5	5	A	B	A		5
Mercury	0.27 A Zone 0.13 C Zone	(1)	5						5	5		
Nickel	23 A Zone 31 C Zone	(1)	A[1]	5	A			A[4]	5	A	A[5]	A

Constituents of concern	MACL (μg/l)	MACL SOURCE	Landfarms/landfill 15 Sector	Castro/Plant 1 Add. Sector	North Yard Sector	Bayside North	Bayside south	Alkane Sector	Effluent Sector	Reclamation Yard Sector	Pollard Sector	Interior "C" zone
Zinc	81	F4a	A	5	5			A	5	5	A[5]	5
Fluoride	NE	-						SA				
Un-ionized Ammonia-N	25	Basin Plan							B[1]	5[2]		
pH	6.5 to 8.5	Basin Plan	*	*	*	*	*	*	*	*	*	*
Turbidity (NTUs)	NE	-	*	*	*	*	*	*	*	*	*	*
Temperature	NE	-	*	*	*	*	*	*	*	*	*	*

Notes:
F4a = Table F4A of the 2011 Water Board ESLs
F4d= Table F4D of the 2011 Water Board ESLs
SA = Analyte is collected semi-annually
A = Analyte is collected annually
B = Analyte is collected biennially during summer/fall reporting period every 2 years (even-numbered years)
5=Analyte collected every 5 years

* Water quality measurements collected during each sampling event
(1) Background Site Groundwater Concentration 95% UCL

A[1] = 234C and 235C sampled semi-annually
A[2] = 323A and 556A sampled semi-annually
A[3]= 340AT, 345AT sampled semi-annually
A[4]= 595AT and 223C sampled semi-annually
A[5] = 260A and 262A sampled quarterly
A[6]= 232A, 233A, 551A, 552A sampled semi-annually
A[7]= 550A and 675A sampled semi-annually
A[8]= 390AT and 391AT sampled semi-annually
A[9]= 108A and 179A sampled semi-annually

B[1] = 108A, 164A and 179A sampled semi-annually
B[2]= 290A, 369S, 370A, 564A, 643A and 238C sampled annually. 560A sampled semi-annually.

5[1] = 556A sampled semi-annually
5[2] = 290A, 560A, 564A, and 369S sampled semi-annually
5[3] = 234C and 235C sampled semi-annually
5[4] = 178C sampled biennially

NE = not established
(NTUs) = Nephelometric Turbidity Units

Table 3
Landfarm Area Monitoring Well Network

Monitoring Wells for Landfarm Area
"A" Zone Wells
183A (POC)
610A (POC)
645A
672A
P284A (POC)
P384A
P386A
657A*
659A (POC)*
673A*
677A*
"C" Zone Wells
251C (POC)
506C (POC)
587C
654C (POC)
655C (POC)
674C
678C (POC)
679C (POC)
680C (POC)

Notes:
POC indicates that well is a point of compliance well.
*Well contains free-phase liquid hydrocarbons. Sampling is temporarily suspended

Table 4: Landfarms Post-Closure Monitoring Program Monitoring Parameters, Constituents of Concern and MACLs

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (4)	"C" zone Well Monitoring Frequency (4)
Monitoring Parameters				
pH	6.5 to 8.5 units	Basin Plan	*	*
Specific Conductivity	NE	-	*	*
Turbidity	NE	-	*	*
Temperature	NE	-	*	*
Arsenic	36	F4a	A	SA
Lead	2.5	F4a	A	SA
Nickel	23 A Zone 31 C Zone	Background 95% UCL	A[3]	SA
Zinc	81	F4a	A	SA
TPH-Gasoline	500	F4a	A[2]	SA
TPH-Diesel	640	F4a	A[1]	SA
TPH-Diesel Silica Gel	640	F4a	A[1]	SA
Benzene	46	F4a	A[2]	SA
MTBE	8000	F4a	A	SA
Toluene	130	F4a	A	SA
Constituents of Concern				
Cadmium, Dissolved	3.2 A Zone 8.2 C Zone	Background 95% UCL	5	B
Chromium VI, Dissolved	11	F4a	5	B
Mercury, Dissolved	0.27 A Zone 0.13 C Zone	Background 95% UCL	5	B
Selenium, Dissolved	14 A Zone 17 C Zone	Background 95% UCL	5	B
Dissolved sulfide	NE	-	B[2]	B
Methylene Chloride	1600	F4d	5	B
Acenaphthene	23	F4a	5	SA
Acenaphthylene	30	F4a	5	SA
Anthracene	0.73	F4a	5	SA
Benzo(a)anthracene	0.027	F4a	5	SA
Benzo(a)pyrene	0.014	F4a	5	SA
Benzo(b)fluoranthene	0.049	F4d	5	SA
Benzo(g,h,i)perylene	0.1	F4a	5	SA
Benzo(k)fluoranthene	0.049	F4d	5	SA
Chysene	0.049	F4d	5	SA
Dibenzo(a,h)anthracene	0.049	F4d	5	SA
Fluoranthene	8	F4a	5	SA
Fluorene	3.9	F4a	5	SA
Indeno(1,2,3-cd)pyrene	0.049	F4d	5	SA
Naphthalene	24	F4a	5	SA
Phenanthrene	4.6	F4a	5	SA
Pyrene	2	F4a	5	SA
Pentachlorophenol	7.9	F4a	5	B

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (4)	"C" zone Well Monitoring Frequency (4)
Benzenethiol	NE	-	5	B
Benzyl Butyl phthalate	NE	-	5	B
Bis 2-ethylhexyl phthalate	5.9	F4d	5	B
Chromium, dissolved	180	F4a	5	B
Di-n-butyl phthalate	NE	-	5	B
2,4-dimethylphenol	110	F4a	5	B
Ethylbenzene	43	F4a	5	B
1-methylnapthalene	NE	-	5	B
7,12-dimethyl benzo(a)anthracene	NE	-	5	B
2-methylphenol	NE	-	5	B
3,4-methylphenol	NE	-	5	B
Phenol	260	F4a	5	B
Trichloroethene	81	F4d	5	B
1,1,1-trichloroethane	62	F4a	5	B
Chlorobenzene	25	F4a	5	B
Methyl chrysene	NE	-	5	B
Total Xylenes	100	F4a	5	B
2-methylnaphthalene	2.1	F4a	5	B
Acetophenone	NE	-	5	B
Barium	1000	F4a	5	B
Cobalt	3 A Zone 21 C Zone	F4a A Zone C Zone Backg.	5[1]	B
Copper	9.3 A Zone 8.5 C Zone	Background 95% UCL	5	B
N-Nitrosopiperidine	NE	-	5	B
Silver	0.19 A Zone 17 C Zone	F4a A Zone C Zone Backg.	5[1]	B
Vanadium	19	F4a	5	B
Vinyl chloride	530	F4d	5	B
Appendix IX Parameters (3)				
Metals (Methods 6010,7060, 7470)	NE	-	5	-
SVOCs (Method 8270)	NE	-	5	-
VOCs (Method 8260)	NE	-	5	-

Notes:
F4a = Table F4A of the 2011 Water Board ESLs
F4d= Table F4D of the 2011 Water Board ESLs
A = Analyte is collected annually
SA = Analyte is collected semi-annually
B = Analyte is collected biennially during summer/fall reporting period every 2 years (even-numbered years)
5=Analyte collected every 5 years

* Water quality measurements collected during each sampling event

A[1] = 183A, 610A, 645A, P284A, P384A and P386A sampled semi-annually
A[2] = 183A sampled semi-annually
A[3] = 183A, P284A and P384A sampled semi-annually
B[1] = Biennially at POC wells. Every 5 years at all other wells. Within the first year in new wells.

B^2 = 645A, 672A sampled semi-annually
5^1 = P284A and P384A sampled semi-annually
2. MACL is the maximum allowable concentration limit. .
3. Parameters are listed in Appendix IX to 22CFR 66264 for analysis via Methods 6010, 7060, 7470, 8260, 8270. Appendix IX parameters that are detected, but are not COCs, will be added to the list of COCs for all wells..
4. Monitoring for COCs and Appendix IX parameters will alternate between highest and lowest groundwater levels.

PAHS are polynuclear aromatic hydrocarbons
POC is point of compliance

NE is not established

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2011-0036

UPDATED WASTE DISCHARGE REQUIREMENTS
AND RESCISSION OF ORDER NO. 00-043 FOR:

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Regional Water Board, finds that:

OWNERSHIP AND LOCATION

1. Chevron Products Company, a subsidiary of Chevron USA, Inc., (hereinafter called Chevron or the Discharger) owns and operates the Chevron Richmond Refinery (hereinafter called the refinery). The refinery was built in 1902 and produces a broad range of fuels, lubricants, asphalt and petrochemicals. The 2,900-acre refinery is located along the southern shore of San Pablo Bay in Contra Costa County (Figure 1). The City of Richmond lies to the east of the refinery. To the east and within one mile from the refinery are industrial, residential, and commercial land uses. Certain wastes generated from the refinery's processes have historically been deposited in Waste Management Units within the refinery, prompting the need for these Waste Discharge Requirements (WDRs).

PURPOSE OF ORDER UPDATE

2. This Order rescinds outdated WDRs and updates the requirements for continued maintenance and monitoring of the inactive and closed Waste Management Units, along with the requirements for the Waste Management Unit corrective action and water quality monitoring programs.

REGULATORY HISTORY

3. Prior to this Order, the Regional Water Board regulated the Waste Management Units and the refinery-wide investigations and corrective actions under Order No. 00-043. The refinery-wide investigation and corrective action activities not associated with the Waste Management Units will be addressed under separate Site Cleanup Requirements Order (SCRs).

   Other Orders previously adopted, but now rescinded, for the refinery are:

93-109	Waste Discharge Requirements
93-016	Site Cleanup Requirements for the S.P. Hill Tank Field
92-092	Site Cleanup Requirements for the Alkane Sector
92-010	Waste Discharge Requirements for Landfill 15
91-098	Cease and Desist Order for Pollard Pond and the Hydropits
90-146	Site Cleanup Requirements for Plant l/Additives Plant
89-175	Waste Discharge Requirements
89-011	Cease and Desist Order for the Pollard Pond
88-044	Waste Discharge Requirements
83-13	Waste Discharge Requirements
81-55	Waste Discharge Requirements

4. The Regional Water Board adopted Order No. R2-2006-0035 (NPDES No. CA0005134) on June 14, 2006. This permit regulates the discharge of effluent from the Discharger's wastewater treatment system, and the discharges of all stormwater associated with industrial activity from the refinery to San Pablo and San Francisco bays.

5. Effective July 18, 1997, many provisions of the California Code of Regulations (CCR) for non-hazardous waste were moved from Division 3, Chapter 15 into Title 27, Division 2 (Title 27). Where applicable, the new regulatory citations have been incorporated in this Order.

FACILITY DESCRIPTION AND HISTORY

Hydrogeologic Setting

6. The refinery and its tankfields are located on the peninsula of the Potrero-San Pablo Ridge, which is composed of the steeply dipping Franciscan Complex. The refining of the petroleum products generally occurs on the bay fill areas northeast of the ridge. The southwest side of the ridge consists of steep topography where the Franciscan Complex has been terraced for the placement of aboveground petroleum storage tanks.

7. Past fluctuations in sea level created a complex sedimentary sequence of interfingered estuarine and alluvial fan deposits overlying the Franciscan Complex bedrock. The uppermost deposits are artificially placed bay fill, ranging from approximately 3 feet to approximately 30 feet in depth. The fill materials overlie bay muds, which consist of silt and silty clay with abundant plant matter or peat. The bay muds overlap onto the Franciscan bedrock and thicken bayward.

8. Three hydrogeologic zones have been identified within the top 150 feet of sediments in the flat lying areas of the refinery, the A-Zone, the C-Zone, and the B-Zone, in order of increasing depth.

    a. The A-Zone is the first water bearing zone and consists of artificial fill and the naturally occurring peat rich, bay mud. The water table elevation for this zone is within two to ten feet of the ground surface and generally discharges to the Bay.

    b. The C-Zone is an 80 to 90-foot-thick water bearing zone of interfingered alluvial and estuarine sediments. These sediments generally have low hydraulic conductivity, but sandy, more permeable units occur as channels and lenses. The sand units have not been shown to be contiguous across the site, but do appear to be hydraulically connected. However, based on several years of chemical data there is no indication that the C-Zone groundwater has been significantly impacted. Chevron has concluded that the bay mud has been an effective hydraulic barrier between the A- and C-Zones and has prevented the migration of contaminants in groundwater from the A-Zone to the C-Zone. These results and

conclusions were presented to the Regional Water Board in two reports titled C-Zone Investigation - Phase 1 and Phase 2, dated February 8 and December 20, 1991, respectively, and continue to be supported by groundwater monitoring data collected pursuant to the refinery-wide Self-Monitoring Program.

c. The B-Zone is a relatively permeable unit at approximately 100 feet below the ground surface. It ranges from 5 to 15 feet thick and contains potable water, but has limited production capacity. The B-Zone occurs under artesian conditions and appears to be hydraulically separate from the overlying zones.

9. As shown in Figure 2, the refinery lies in four geomorphic/geologic settings referred to locally as the "Alluvial," "Flats," "Ridge," and "Transition" Zones.

a. The **Alluvial Zone** is defined as the broad area of alluvial fan deposits, derived from the Berkeley Hills, east of the refinery. This zone represents flatland areas in which bay mud was not deposited. The upper portion of the alluvial fan deposit is typically clayey with low permeability.

b. The **Flats Zone** comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of Potrero-San Pablo Ridge. For the purpose of the refinery's investigations, the inland Flats Zone/Alluvial Zone boundary has been defined to be the 5-foot bay mud isopach (line of equal thickness). Thus, the Flats Zone is typically underlain by at least five feet of bay mud except where removed by excavation or erosion, in local areas of non-deposition, or where displaced by differential settlement of overlying fill.

c. The **Ridge Zone** consists primarily of colluvium (slope wash) overlying deformed Franciscan Complex rocks exposed along Potrero-San Pablo Ridge. The boundary of the Ridge Zone is defined as those areas of Potrero-San Pablo Ridge above the 50-foot elevation contour.

d. The **Transition Zone** is defined as the area that separates the Flats Zone from the Ridge Zones. As described above, the Flats-Transition boundary is defined as the 5-foot bay mud isopach and the Ridge-Transition boundary is defined as the 50-foot elevation contour.

10. Chevron has subdivided the refinery into ten geographic sectors (see Figure 3). Each sector has unique hydrogeology and varying degrees of environmental concern. The sectors are as follows:

    - Landfarms/Landfill 15
    - Castro/Plant 1 Additives
    - North Yard
    - Bayside Sector – North
    - Bayside Sector - South
    - Alkane Sector
    - Effluent
    - Reclamation
    - Pollard
    - Interior "C" Zone or Main Yard

11. Sector boundaries are generally defined by a physiographic boundary separating adjacent sectors, or by the refinery property line. The upgradient sector boundaries for the Alkane, North Yard, and Main Yard sectors correspond to an inferred groundwater drainage divide, which is generally coincident with topographic drainage divides along San Pablo Ridge. The upgradient sector boundaries for the Landfarms/Landfills, Castro, and Reclamation sectors are generally coincident with the refinery property line. The Bayside North and Bayside South sectors include all Chevron properties on the southwestern side of San Pablo Ridge and adjacent to San Francisco Bay. With the exception of the Bayside North and Bayside South sectors (which are on the west side of the San Pablo Ridge), all sites described in this Order are largely contained by the groundwater protection systems, which are described below.

Corrective Action

12. All sectors have impacted soil and/or groundwater from historic releases and corrective action steps have been implemented. Some of the sectors contain Waste Management Units that are either in the Title 27 Corrective Action Monitoring Program or part of the refinery effluent system; these include the Alkane, Reclamation, North Yard, Effluent, and Landfarms/Landfill sectors. Corrective action occurring at sectors comprised of only impacted soil and/or groundwater from historic releases and not associated with Waste Management Units will be addressed by the SCRs presently under development; these include the Pollard, Castro/Plant 1 Additives, Bayside North, Bayside South and Interior C Zone sectors.

13. Chevron has implemented corrective actions to intercept contaminated groundwater at various locations and thus to prevent migration to San Pablo Bay. The corrective actions include systems comprised of varying combinations of slurry walls, extraction trenches and/or extraction wells for hydraulic control at different locations within the refinery. The systems comprised of slurry walls and/or extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and the

Castro/Plant 1 sectors are referred to collectively as the Groundwater Protection Systems (GPS) (see Figure 4). The GPS establishes and maintains a contiguous capture zone which prevents migration of potentially contaminated A-Zone groundwater past the GPS alignment. The slurry walls were installed where thick and/or highly permeable intervals of A-Zone fill soils are encountered. A low permeability bay mud "floor" inhibits transport of A-Zone contaminants to the underlying C-Zone in the "Flats Zone" of the Refinery (see Figure 13).

14. Approximately 24,700 feet of extraction trench, 18,535 feet of barrier wall, over 200 groundwater extraction sumps, and one groundwater treatment plant have been installed. The extracted groundwater is routed to the refinery's wastewater treatment system and discharged in accordance with existing NPDES permit requirements. The GPS extraction trenches and barrier wall are illustrated in Figure 13.

15. The Regional Water Board has determined that the GPS comprised of the slurry walls and extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and Castro/Plant 1 sectors is a satisfactory corrective action measure for the containment and removal of contaminated groundwater along the perimeter of the refinery. The corrective action at the Alkane, North Yard, Effluent, Landfarms/Landfill, and the Reclamation sectors are addressed by this Order. Activities associated with the Castro/Plant 1 Additives, Pollard, Bayside North, Bayside South and Interior C Zone sectors will be addressed in separate SCRs. There is a single groundwater monitoring program for all sectors which is contained in both these WDRs and the SCRs.

Waste Management Units

The following is a summary of actions taken at previously-identified Waste Management Units pursuant to previous Regional Water Board orders organized by the refinery sectors subject to this Order.

Landfarms/Landfill Sector

16. Perimeter Groundwater Barrier and Soil cover: A GPS barrier wall and/or extraction trench is at the downgradient edge and largely surrounds this sector, consisting of Landfill 15 and the landfarms (described below, see Figures 8 and 12). The monitoring program (as described in the attached monitoring program) monitors both the performance of the GPS (A-Zone corrective action monitoring) as well as C-Zone wells (corrective action monitoring and detection monitoring for Landfarms No. 2-5) for the monitoring parameters (MP) and Constituents of Concern (COC) noted in the monitoring program. Chevron is responsible for inspection and maintenance of the soil cover and stormwater conveyances for the Landfill 15 and Landfarm soil covers.

17. Landfill 15: Landfill 15 is a 41-acre former tidal marsh area converted for waste disposal use (Figure 8) containing about 270,000 cubic yards of waste. The site was used from the early 1960's to 1987 as an evaporation pond and as a landfill for a

variety of wastes including sludges (separator, paint, and water treatment), oily soil and dredge spoils, resins, catalyst fines, lime, and sulfur. Approximately 13 acres of Landfill 15 were reactivated in 1992 for disposal of treated non-hazardous acidic sludge and dredged bay mud generated from the closure of Pollard Pond. The portion of the landfill that accepted the Pollard Pond closure waste was closed by placement of a multi-layer low-permeability cap. The remaining 28 inactive acres that ceased receiving waste material prior to 1987 were capped in 1996 and 1997. No further closure activities are required.

18. Old Drum Storage Area: This is a 180 ft. by 90 ft. area used for storing up to 2448 drums until 1984. The unit was closed in 1986 and is covered with a concrete cap with stormwater diversion away from the site.

19. Landfarms: Between the 1970's and 1987, Chevron conducted landfarming operations at five locations to promote biodegradation of oily soils. Landfarm No. 1 is 13.5 acres and is located in the North Yard sector. Landfarms No. 2-5 are 8, 3.5,3 and 1 acres, respectively. The landfarms were built by placing clean fill over existing waste which contained slop oil solids, leaded tank bottoms, separator sludge and other wastes. The landfarms were used to biologically treat 30,000 tons per year of non-leaded tank bottom sludge, oil water mixtures and other sludges and contaminated soil. The landfarms have not received waste since 1987. A Final Closure Plan for the landfarms was approved in 1998, and closure was completed the following year, which consisted of importing fill, grading, installation of a vegetative cap and shallow groundwater extraction trenches.

20. Landfill under Landfarms Numbers 2 and 3: The unit held about 80,000 cubic yards of refinery waste, completely within the bounds of both Landfarms No. 2 and No. 3. Landfilling was finished about 1977, with the landfarming beginning in about 1980.

North Yard Sector

21. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench is at the downgradient edge of Landfarm No. 1 and the North Yard, located in this sector (see Figure 12). The monitoring program (as described in the attached monitoring program) monitors both the performance of the GPS (A-Zone corrective action) as well as C-Zone wells (corrective action monitoring and detection monitoring at Landfarm No. 1) for the MP and COC also noted in the monitoring program. The aboveground tanks in this area also are subject to the inspection and monitoring programs described below.

22. Tetraethyl Lead Site (TEL): This was a 300 cubic yard impoundment formerly used for tank bottom sludges containing TEL. The wastes were removed in 1980. The soil was removed and disposed of as hazardous waste, and, in the early 1980's, Landfarm No. 1 was expanded over the site. Landfarm No. 1 was subsequently closed as noted in Finding 19.

23. Big Wheels Site: This was an 80 cubic yard impoundment for holding slop oil emulsion prior to landfarming. In 1980 it was clean closed, with the wastes and contaminated soil being placed in the landfarms, which were closed as noted above.

24. Landfill Under Isomax and Landfarm No. 1: This holds about 400,000 cubic yards of waste, such as slop oil solids, separator sludge, leaded tank bottoms. Final closure for the landfarms was achieved as noted above.

25. Oil Water Separators 1, 1A, 2, 2A, 13, 15, and Coalescing plate interceptor: The separators have been used to skim off oil, which is returned to product tankage. Solids settle and the effluent is routed to the Bioreactor. The sludge is a listed hazardous waste and formerly was landfarmed, but now is disposed of offsite or is recycled as a supplemental fuel. Separators 1, 2, 15 and CPI were cleaned and backfilled with clean fill.

26. No. 1 Oxidation Pond: There is petroleum hydrocarbon-contaminated soil in the No. 1 Oxidation pond. The 116-acre pond was built in 1959 and was formerly part of the refinery's effluent treatment system until the late 1980's. It is divided into five basins known as passes. Pass 1 was clean closed in 1990 and is now used for stormwater storage. Passes 2-5 contain oily sediment. In 2008, Regional Water Board staff approved a final closure plan that proposed the placing of sediments dredged from Castro Cove and other non-hazardous refinery soil within the pond, then stabilizing this material with cement and fly ash to support a final Title 27 closure cap. The Final Closure Plan was slightly modified in 2009 and again in 2010. This work is expected to be completed during 2011.

27. Lake Rushing and Majka Ditch: These transported stormwater to the No. 2A separator. 300 cubic yards of contaminated soil were removed from the ditch in 1987.

28. Poleyard Tankfield: There are 32 aboveground petroleum storage tanks, with 24 in service with a total volume of 2 million barrels. Most of these tanks have leak detection bottoms. There are a total of six impound basins including Lake Rushing, Lake Schramm (see below) and four others.

29. Lake Schramm: This was formerly an unlined surface impoundment used for disposal of leaded tank bottoms. 1300 cubic yards of leaded tank bottoms were removed in 1981, and the Lake is now lined and used to contain stormwater runoff.

Alkane Sector

30. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench is at the downgradient edge of the Alkane Sector (see Figure 7). The monitoring program (as described in the attached monitoring program) monitors both the performance of the A- and C-Zone corrective actions noted in the monitoring program. Chevron is

31. Sulfur Recovery Unit Settling Basin: This 3590-gallon basin receives low pH solutions from the sulfur recovery unit, with the supernatant being routed to the wastewater treatment plant.

32. Mud Sump: This unit formerly stored mud and solids that settled at the bottom of the No.13 Separator, but has now been cleaned and backfilled with clean soil.

33. Hydropits: The Hydrolyzing Pits (Hydropits) were three small unlined surface impoundments located on the shore of San Pablo Bay in the Alkane Sector (Figure 7) that historically received wastewater from the refinery's Alkane Plant until 1986. The most significant constituents of this waste stream were neutralized hydrofluoric acid and small amounts of oil containing benzene. Chevron submitted a closure report in 1992. The Hydropits Closure Unit includes a multi-layer cap and the Alkane GPS along the northeastern perimeter of the Hydropits adjacent to Castro Cove. The unit no longer contains liquid hazardous waste and, as such, meets the cease discharge requirements of the Toxic Pits Cleanup Act. No further closure activities are necessary or required for the Hydropits.

34. Schaeffer Slough: This ditch carried the effluent from the Hydropits to the No. 13 Separator for eventual discharge to the wastewater treatment system. The slough has now been closed.

35. No. 13 Separator: This oil/water separator has a volume of 960,000 gallons. In concert with the Mud Sump, it treated oily process water, with the supernatant being routed to the wastewater treatment system.

36. Alkane Plant: There are shallow groundwater plumes containing benzene, fluoride, and free-phase petroleum hydrocarbons originating from the Alkane Plant area (Figure 7). This contamination necessitated source area remediation consisting of free product recovery and groundwater extraction and treatment in addition to implementation of the refinery-wide GPS. In 2001, Chevron started operating eight extraction wells designed to recover floating liquid hydrocarbons and contaminated groundwater in the Alkane Plant plume source area upgradient of the Hydropits Closure Unit and the Alkane Sector GPS. These extraction wells make up the Alkane Plant Groundwater Recovery System. Groundwater and liquid hydrocarbons recovered by the extraction wells are routed to the refinery's wastewater treatment system and is discharged in accordance with existing NPDES permit requirements.

37. Pond 13A: This pond was used to store fluoride salts originating from the Hydroloyzing Pits. It had a capacity of about 28,000 cubic yards and was clean closed in 1992.

38. No. 7 sump: This sump formerly collected stormwater runoff, but is now out of service and is backfilled.

39. Alkane Tankfield: Historically, there were 40 tanks in this tankfield. Currently, no tanks are in active service in this tankfield.

Effluent Sector

40. Perimeter Groundwater Barrier: A GPS barrier wall extends along the 250-foot channel (described below, see Figure 10). The monitoring program (as described in the attached monitoring program) includes A- and C-Zone wells for the evaluation of the performance of the GPS (corrective action).

41. Bioreactor: The Bioreactor was excavated to about -40 feet Mean Sea Level in the early 1900's to be used as a turning basin for ships. Now this 30-acre pond conducts the refinery's secondary wastewater treatment by means of 1100 aerators and a series of baffles.

42. No. 2 Oxidation Pond: This 90-acre pond was historically used for final polishing of NPDES-regulated treated wastewater prior to its discharge to the Bay. The pond was converted to an Experimental Water Enhancement Wetland (Wetland), which is downstream of the biological treatment settling basins (Bioreactor). The treated water from the Wetland and Bioreactor are combined and routed through granular activated carbon, and is discharged in a deep water diffuser, which is the Refinery's NPDES' Point of Compliance under the NPDES permit referenced in Finding 4.

43. 250-foot channel: The 250-foot channel was excavated to about -40 feet MSL in the early 1900's to be used as a shipping channel for the refinery until the 1950's. The channel was then dammed and used as part of the wastewater treatment system until 1987, and now serves to store stormwater and treated process water.

    In 2002, Chevron proposed and implemented interim corrective actions for the channel. These included installation of a High Density Polyethylene barrier, fencing, bank steepening, vegetation control and removal of perching objects used by birds. Chevron also continues collection and removal of oil, and vegetation management and wildlife surveys. Lastly, Chevron conducts water elevation monitoring to assure that there is neither a vertical or lateral gradient allowing for release of contaminated water to either groundwater or the Bay. Ongoing monitoring indicates limited wildlife exposure, that A-Zone groundwater flow is fully contained by the GPS, and that there is largely an upward flow into the channel for the C-Zone water.

44. 50/100 foot channel: This channel conveyed wastewater to the bioreactor. Sampling showed the wastes to be non-hazardous. The channel has been cleaned and converted for use in conveying non-contaminated stormwater to the Bay after sampling.

45. Pond 11: This site received oily waste and paint sludge from the Drum Reconditioning Plant. The site was clean-closed in 1979.

46. Pond 14: This 4,300-cubic yard pond also received waste from the Drum Recondition Plant until 1979. In 1980, all wastes and some underlying soil were removed.

Reclamation Sector

47. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench largely surrounds the sector's units listed below (see Figure 11). The monitoring program (as described in the attached monitoring program) monitors the performance of the GPS corrective action. Chevron is responsible for inspection and maintenance of the soil cover and stormwater conveyances for the Gertrude Street and Parr-Richmond units.

48. Reclamation Yard Site: Chevron bought this site in 1958, which had been the former City of Richmond municipal landfill since 1947 and has a capacity of about 187,500 cubic yards. No waste disposal occurred following Chevron's purchase of the site.

49. Parr-Richmond Site: Chevron bought this site in 1954, which had been used for municipal landfilling and junkyard storage since 1930. A final cover was built over it in 1997.

50. Gertude Street Site: This 3-acre site was purchased by Chevron and then leased to an outside party that used it for auto dismantling and drum reconditioning between 1961 and 1983. The drums were removed in 1983. In 1987, the site was graded and, in 1997, a final cover was installed along with a groundwater extraction trench.

Seismicity

51. Earthquakes posing a threat to the refinery could occur along the Hayward, San Andreas and Calaveras faults. The maximum ground surface acceleration, calculated for soft to medium clay and silt sites, is expected to be 0.35g for an event originating from a Richter Magnitude 6.4 Maximum Probable Earthquake (MPE) at the Hayward fault about 3.7 km east of the site, 0.35g for an event originating from a Richter Magnitude 7.75 MPE at the San Andreas fault located about 24 km west, and 0.35g for an event originating from a Richter Magnitude 6.6 MPE at the Calaveras fault. In an effort to prepare for such an incident, Chevron routinely and systematically reviews all process facilities for potential hazards, including a seismic review of appropriate structures. In accordance with federal, State and local requirements, Chevron also maintains a facility emergency response plan and tsunami contingency plan for the Richmond Long Wharf.

Aboveground Petroleum Storage Tanks

52. Aboveground petroleum storage tanks are required to comply with the requirements of Chapter 6.67 Section 25270 of the Health and Safety Code. In part, the regulations require installation and utilization of a leak detection system for each regulated tank that has the potential to impact groundwater or surface waters. The refinery operates approximately 160 aboveground petroleum storage tanks with a total storage capacity of approximately 600 million gallons. The majority of these tanks now have leak detection bottoms (LDBs), as Chevron has installed LDBs on all new tanks constructed at the refinery and retrofitted old tanks with LDBs if they are kept in service after their steel bottoms need to be replaced.

53. Aboveground petroleum storage tank facilities are also required to have secondary spill containment for the capture of sudden releases from an aboveground petroleum tank. The refinery utilizes several different types of soil berms, spill collection basins and channels located in the tank fields for containment and diversion of petroleum hydrocarbon releases. The primary regulation governing this activity is Code of Federal Regulations 112.7 Spill Prevention Control and Countermeasure Plans (SPCC). The SPCC is designed to prevent spills at petroleum facilities to the maximum extent practicable and mitigate a spill if it occurs.

MONITORING PROGRAMS

54. To record the compliance of the waste management units and surface impoundments described above, Chevron is required to implement the attached monitoring program described in these WDRs. The monitoring program requires groundwater level and chemical monitoring for inorganic and organic MPs and COCs (both terms are further defined in Specification 5, below) along a point of compliance (POC - also defined in Specification 5, below and generally coincident with the GPS where present). The MPs and COCs are typically metals, semivolatile organic compounds, and volatile organic compounds.

55. In the Landfarm areas, the A-Zone monitoring helps demonstrate that the GPS is maintaining a hydraulic barrier and by evaluating the effectiveness of the GPS as a Corrective Action Monitoring Program. The C-Zone monitoring helps verify that water quality below the bay mud at the POC of the landfarms has not been degraded and is considered to be a Detection Monitoring Program. Outside of the Landfarm area, the A-Zone monitoring likewise helps validate the GPS performance as a Corrective Action Monitoring Program, but C-Zone monitoring is considered to be corrective action monitoring.

56. Pursuant to a plan approved by the Regional Water Board in 2002, Chevron performs a statistical evaluation and trend analysis of groundwater well monitoring results, to establish concentration trends and note the overall effectiveness of the remedial actions at the refinery.

57. Chevron also reports on groundwater elevations, flow patterns and velocities, hydrocarbon thicknesses and recovery, and closure unit monitoring, inspection and maintenance activities as part of their monitoring program.

BASIN PLAN

58. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law and the U.S. EPA, where required.

BENEFICIAL USES

59. Shallow groundwater beneath the "Flats Zone", which comprises the flatland marsh area bounded by the San Pablo Bay to the north and extending south along the northeast side of the Potrero-San Pablo Ridge, has Total Dissolved Solids (TDS) levels that are significantly higher than the 3000 mg/l (5000 μS/cm electrical conductivity) level which the Regional Water Board (Resolution No. 89-39) set as a maximum for a municipal or domestic water supply in its Sources of Drinking Water Policy. There is no historical, existing or planned use of groundwater as a source of drinking water in either the shallow (A- and C-Zones) or deeper (B-Zone) aquifers in this part of the refinery.

    Groundwater beneath the "Ridge Zone," which is bounded on the south by San Francisco Bay and extends northwest up to the top of the Potrero-San Pablo Ridge (Bayside sectors), is primarily contained in fractured bedrock of the Franciscan Complex. Based on hydraulic conductivity data collected during hydrogeologic investigations of the tankfields in the Bayside North and Bayside South sectors, it is unlikely that a single well could produce an average sustained yield of 200 gallons per day for drinking water supply purposes (State Water Board Resolution No. 88-63, exemption criterion 1(c), and Regional Water Board Resolution No. 89-39). There is no historical, existing or planned use of unconfined groundwater as a source of drinking water in this part of the refinery.

    There is the potential, however, for groundwater on either side of the Potrero-San Pablo Ridge to discharge into San Francisco and San Pablo bays at the shoreline groundwater/surface water interface. Therefore, the surface water beneficial uses named in the Basin Plan for these bodies of water are applicable to groundwater in POC monitoring wells near the shoreline interface.

60. The existing and potential beneficial uses of groundwater underlying the site that is not contained in bedrock and is greater than 100 feet below ground surface are:

a. Industrial process and service supply
b. Agricultural water supply
c. Municipal and domestic supply (however, due to the proximity of the Bay, groundwater at the site contains elevated TDS levels, which render the groundwater nonpotable)

61. The existing and potential beneficial uses of San Francisco and San Pablo bays are:

a. Ocean, commercial, and sport fishing
b. Shellfish harvesting
c. Estuarine habitat
d. Fish migration
e. Preservation of rare and endangered species
f. Fish spawning
g. Wildlife habitat
h. Water contact recreation
i. Non-contact water recreation
j. Industrial service supply
k. Industrial process supply
l. Navigation

CALIFORNIA ENVIRONMENTAL QUALITY ACT

62. This action is an Order to enforce the laws and regulations administered by the Regional Water Board. This action is categorically exempt from the provisions of the California Environmental Quality Act pursuant to Section 15308, Title 14, CCR.

NOTICE AND MEETING

63. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to amend the WDRs, and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

64. The Regional Water Board, at a public meeting, heard and considered all comments pertaining to this amendment of WDRs.

IT IS HEREBY ORDERED pursuant to the authority in Section 13263 of California Water Code (CWC), Title 27, Division 2, Subdivision 1 of the California Code of Regulations (27CCR), and Chapter 15, Division 3, Title 23 of the CCR (Chapter 15) that the Discharger, its agents, successors, and assigns shall meet the applicable provisions contained in 27CCR, Chapter 15, and Division 7 CWC, and shall comply with the following:

PROHIBITIONS

1. Migration of pollutants through subsurface transport to waters of the State outside of the GPS is prohibited.

2. There shall be no discharge of wastes to surface waters except as permitted under the National Pollutant Discharge Elimination System.

3. The treatment, discharge or storage of materials that may impact the beneficial uses of groundwater or surface water shall not be allowed to create a condition of pollution or nuisance as defined in sections 13050 (l) and (m) of the CWC, nor degrade the quality of waters of the State or of the United States.

4. The creation of any new Waste Management Unit (WMU) is prohibited without prior Regional Water Board staff written concurrence.

5. The relocation of wastes is prohibited without prior Regional Water Board staff written concurrence.

6. The relocation of wastes to or from WMUs shall not create a condition of pollution or nuisance as defined in CWC sections 13050 (l) and (m). Any relocated waste shall not be placed in or allowed to contact ponded water from any source whatsoever. Wastes shall not be relocated to any location where they can be discharged into waters of the State or of the United States.

7. Excavation within or reconfiguration of any existing WMU is prohibited without prior concurrence of Regional Water Board staff. Minor excavation or reconfiguration activities such as for installation of signs or minor landscaping, or for minor routine maintenance and repair do not require prior staff concurrence.

8. Waste shall not be exposed at the surface of any WMU.

9. Disking of WMU covers is prohibited without prior Regional Water Board staff written concurrence. Alternate methods of controlling vegetative growth, which do not affect the integrity of the WMU cap, are preferred.

10. Surface drainage from tributary areas and internal site drainage from surface or subsurface sources shall not contact or percolate through wastes during the life of the site.

11. The discharge of hazardous waste at the facility is prohibited. For the purpose of this Order, the term “hazardous waste” is as defined in Section 20164 of Title 27.

12. The discharge of leachate or wastewater (including from surface impoundments, process waters, and runoff from the plant operations areas) that: 1) have the potential to cause corrosion or decay, or otherwise reduce or impair the integrity of the

containment structures; 2) if mixed or commingled with other wastes in the unit, could produce a violent reaction including heat, pressure, fire, explosion, or the production of toxic by-products; 3) require a higher level of containment than provided by the unit; 4) are "restricted hazardous wastes", or 5) impair the integrity of the containment structures, are prohibited per Section 20200(2)(b) of Title 27.

13. Activities associated with subsurface investigations and cleanup that will cause significant adverse migration of pollutants are prohibited.

14. There shall be no discharges to a surface impoundment, and any residual liquids and sludge shall be removed expeditiously if it is determined the surface impoundment is leaking or there is a failure which causes a threat to water quality.

15. Wastes shall not be disposed in any position where they may migrate from the disposal site to adjacent geologic materials, waters of the State or of the United States during disposal operations, closure, and during the post-closure maintenance period, per Section 20310(a) of Title 27.

16. The Discharger shall not cause the following conditions to exist in waters of the State at any place outside of the GPS:

    a. <u>Surface Waters</u>
        i. Floating, suspended, or deposited macroscopic particulate matter or foam;
        ii. Bottom deposits or aquatic growth;
        iii. Adversely altered temperature, turbidity, or apparent color beyond natural background levels;
        iv. Visible, floating, suspended or deposited oil or other products of petroleum origin; or
        v. Toxic or other deleterious substances to be present in concentrations or quantities that may cause deleterious effects on aquatic biota, wildlife or waterfowl, or that render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

    b. <u>Groundwater</u>
        i. Further degradation of groundwater quality and/or substantial worsening of existing groundwater impacts; and
        ii. Subsurface migration of pollutants associated with Chevron's operations to waters of the State is prohibited.

SPECIFICATIONS

<u>Reporting Specifications</u>

1. All technical reports submitted pursuant to this Order shall be prepared under the supervision of and signed by a California registered civil engineer, registered geologist, and/or certified engineering geologist.

2. The Discharger shall implement a Detection Monitoring Program (DMP) for the C-Zone groundwater at the Landfarm area, pursuant to CCR Title 27 Section 20420. The Self-Monitoring Program (SMP) attached to this Order is intended to constitute the DMP for the refinery.

3. The Discharger shall also continue the Corrective Action Monitoring Program for the A-Zone groundwater, and the C-Zone groundwater outside of the landfarms, pursuant to CCR Title 27 Section 20430. The program shall be designed to determine if the corrective action measures, such as the operation of the GPS, are functioning and demonstrate compliance with the corrective action program goals. The SMP attached to this Order is intended to constitute the Corrective Action Monitoring Program for the refinery.

4. At any time, the Discharger may file a written request (including supporting documentation) with the Regional Water Board's Executive Officer, proposing modifications to the attached SMP. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the SMP.

Title 27 Compliance Specifications

5. Title 27 requires the Regional Water Board to establish a Water Quality Protection Standard (WQPS) in a WDR order for each WMU covered by that order. The WQPS for the refinery shall include the following:

   (a) Constituents of Concern (COC): Section 20395 of Title 27 defines COCs as "all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit." COCs for the refinery include the monitoring parameters identified in the SMP attached to this Order, or any future amendment thereof, and all Appendix II parameters in the federal Subtitle D regulations.

   (b) Monitoring Parameters (MP): MPs, a subset of the COCs, are typically the most mobile and commonly detected COCs in groundwater at a site and are measured on a more frequent basis than the entire list of COCs. The MPs for the refinery shall include, at a minimum, all constituents identified as such in the SMP attached to this Order, or any future amendments thereof. The Discharger may propose modification to the MPs as additional data become available concerning site-specific source characteristics and natural background water quality. However, modifications shall only be made upon written concurrence from the Executive Officer.

   (c) Maximum Allowable Concentration Limits(MACLs): MACLs have been established for each COC listed in Tables 2 and 4 of the SMP. Concentration limits for all COCs detected at the specified monitoring wells are typically established using the background data set pursuant to CCR Title 27 Section

20400. However, use of background data is inappropriate due to the number of releases over the many years of refinery operations, as it may be technologically and/or economically infeasible to cleanup all petroleum refining-related constituents in the groundwater to background concentrations (non-detect for synthetic organics). The MACLs were thus developed to protect the beneficial uses of shallow groundwater beneath the refinery. The applicable beneficial uses with the most stringent water quality objectives are related to shallow groundwater discharge to surface waters of San Francisco Bay and include uses involving the health of aquatic organism receptors in the Bay and humans who consume aquatic organisms from the Bay.

(d) Point of Compliance: Title 27 defines the Point of Compliance (POC) as the "vertical surface located at the hydraulically downgradient limit of the Unit that extends through the uppermost aquifer underlying the Unit." The appropriate POC for the refinery, based on the areal extent of groundwater impacts and the large number of WMUs involved, is the GPS extraction trench/barrier wall system, which maintains a hydraulic capture zone to protect sensitive ecological receptors in the Bay and wetlands adjacent to the refinery. The GPS/POC boundary was established under the following guidelines: 1) at the downgradient perimeters of individual WMUs that require corrective action but are non-contiguous with other A-Zone areas under corrective action (e.g., Pollard Pond, Parr-Richmond site); 2) at the furthest downgradient boundary common to a group of WMUs and/or areas under corrective action (e.g., Landfarms 2-5, Plant l/Additives Plant); or, 3) at the refinery shoreline boundary where A-Zone groundwater contamination not associated with specific WMUs is present.

(e) Monitoring Points: Title 27 defines Monitoring Points as “a well, device, or location specified in the waste discharge requirements at which monitoring is conducted and at which the water quality protection standard applies.” Monitoring Points for compliance with the refinery-wide corrective action and detection monitoring program are identified in the SMP. These monitoring points generally consist of shallow groundwater monitoring wells located downgradient of the GPS extraction well capture zone. Because refinery operations predate collection of groundwater chemistry data, background water quality monitoring locations do not exist at this site; therefore, intra-well statistical comparisons will be used for evaluating trends in concentrations of COCs detected in groundwater monitoring wells. Concentrations of petroleum hydrocarbon-related COCs reported above MACLs are expected to exhibit decreasing trends over time as the GPS continues to operate and natural biodegradation processes take place.

6. The refinery site shall be protected from any washout or erosion of wastes or covering material and from inundation that could occur during a 100 year flood event. Final cover systems for WMUs shall be graded and maintained to promote lateral runoff and prevent ponding and infiltration of water.

7. The Discharger shall notify the Regional Water Board immediately of any failure that threatens the integrity of any containment and/or control facilities, structures, or devices. Any such failure shall be promptly corrected after approval of the method and schedule by the Executive Officer.

8. The Discharger shall maintain the WMUs so as to prevent a statistically significant increase in water quality parameters at POCs as provided in CCR Title 27, Section 20420.

9. The Discharger shall maintain the WMUs to prevent discharges, such that the units do not constitute a pollution source.

10. The Regional Water Board considers the Discharger to have continuing responsibility for correcting any problems that arise in the future as a result of waste discharge or related operations or site use.

11. The Discharger shall comply with all applicable provisions of Title 27 that apply to the closure and post-closure of WMUs and the design and maintenance of surface impoundments including those that are not specifically referred to in this Order.

12. WMUs shall be closed according to a closure plan prepared according to all applicable requirements of Title 27, and approved by the Executive Officer.

Remediation Facility Specifications

13. The Discharger shall **annually demonstrate** (include results in the Annual Report) that all installed groundwater remedial systems including, but not limited to, groundwater containment, treatment, and/or extraction systems are functioning as intended and designed.

14. Containment, collection, drainage, and monitoring systems at the refinery, shall be maintained as long as contaminated waste, soil, or water is present and poses a threat to water quality.

15. The Discharger shall maintain groundwater or remediation devices or design features installed in accordance with this Order such that they continue to operate as intended without interruption, with the exception of periodic maintenance.

16. If the Executive Officer determines the existence of an imminent threat to the beneficial uses of surface or subsurface waters of the State, the Discharger may be required to install additional groundwater monitoring wells and/or undertake corrective action measures, including submittal of a site investigation report.

17. The Discharger shall install any additional groundwater and leachate monitoring devices required to fulfill the terms of any future SMP issued by the Executive Officer.

18. The Discharger shall install, maintain in good working order, and operate efficiently any facility, alarm, groundwater extraction system, or hydraulic/contaminant migration control system necessary to assure compliance with these WDRs.

19. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality impairment immediately outside the boundary of the GPS continues to degrade, the Discharger will be required to submit and implement a site specific groundwater corrective action proposal.

Monitoring Specifications

20. The Discharger shall conduct monitoring activities according to the SMP attached to this Order and as may be amended by the Executive Officer, to verify the effectiveness of groundwater remediation and containment systems and WMU closure systems.

21. All monitoring wells shall be constructed in a manner that maintains the integrity of the drill hole, prevents cross-contamination of saturated zones, and produces representative groundwater samples from discrete zones within the groundwater zone each well is intended to monitor.

22. All borings for monitoring wells shall be continuously cored. The drill holes shall be logged during drilling under the direct supervision of a registered geologist whose signature appears on the corresponding well log. Logs of monitoring wells shall be filed with the Department of Water Resources. All information used to construct the wells shall be submitted to the Regional Water Board upon completion of the wells.

23. The groundwater sampling and analysis program shall ensure that groundwater quality data are representative of the groundwater in the area that is monitored.

Surface Impoundment Specifications

24. If it is determined by the Executive Officer that any surface impoundment is degrading beneficial uses, there shall be no discharges to a surface impoundment, and residual liquids and sludges shall be removed expeditiously.

25. The impoundments will be operated such that scouring at points of discharge and by wave action at the water line will not degrade the pond containment features.

26. Pipeline discharges to surface impoundments shall be either equipped with devices, or fail-safe operating procedures, to prevent overfilling. The surface impoundments shall always maintain at least two-feet of freeboard.

27. The Discharger shall operate the surface impoundments according to a detailed operating, maintenance, and contingency plan that will include at a minimum,

procedures for routine inspection of the surface impoundments, discharge into a pond, discharge out of a pond, contingency measures if problems with the containment structures are found, and notification of agencies.

Soil Contamination and Excavated Soil Reuse

28. Chevron shall notify the Regional Water Board of any soil contamination, not previously identified in subsurface investigations, discovered during any subsurface investigation or excavation work conducted on refinery property, which may potentially adversely impact water quality. Chevron shall store, reuse, and/or dispose of non-hazardous contaminated soil according to the *Revised Soil Management Plan, Chevron Richmond Refinery, Contra Costa county, California (SAIC, 2008).*

PROVISIONS

1. Compliance: The Discharger shall comply immediately, or as prescribed by the time schedule below, with all Prohibitions, Specifications, and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. Violations may result in enforcement actions, including Regional Water Board orders or court orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of these WDRs by the Regional Water Board [CWC sections 13261, 13267, 13263, 13265, 13268, 13300, 13301, 13304, 13340, and 13350].

2. Authority: All technical and monitoring reports required by this Order are requested pursuant to Section 13267 of the CWC. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to Section 13268 of the CWC.

Reporting Requirements

3. Technical reports/plans, submitted by the Discharger, in compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be submitted to the Regional Water Board on the schedule specified herein. These reports/plans shall consist of a letter report that includes the following:
   a. Identification of any obstacles that may threaten compliance with the schedule,
   b. In the event of non-compliance with any Prohibition, Specification or Provision of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order; and
   c. In the SMP reports, an evaluation of the current groundwater monitoring system and a proposal for modifications as appropriate.

4. All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:
   a. For a corporation – by a principal executive officer or the level of vice-president or an appropriate delegate.
   b. For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.
   c. For a municipality, State, federal, or other public agency – by either a principal executive officer or ranking elected official.

5. All reports submitted pursuant to this Order must be submitted as both hard copies and electronic files in PDF format. The Regional Water Board has implemented a document database that is intended to reduce the need for printed report storage space and streamline the public review process. All electronic files, whether in PDF or spreadsheet format must be submitted via email (only if the file size is under 1MB), or on CD. Email notification should be provided to Regional Water Board staff whenever a file is uploaded to Geotracker (see below).

6. The State Water Board adopted regulations requiring electronic report and data submittal to the State's GeoTracker database (Title 23, Division 3, Chapter 30, Articles 1 and 2, Sections 3890-3895 of the CCR).

   The Discharger is responsible for submitting the following via Geotracker:
   a. All chemical analytical results for soil, water, and vapor samples;
   b. The latitude and longitude of any permanent sampling point for which data is reported, accurate to within 1 meter and referenced to a minimum two reference points from the California Spatial Reference System, if available;
   c. The surveyed elevation relative to a geodetic datum of any permanent sampling point;
   d. The elevation of groundwater in any permanent monitoring well relative to the surveyed elevations;
   e. A site map or maps showing the location of all sampling points;
   f. The depth of the screened interval and the length of screened interval for any permanent monitoring well;
   g. PDF copies of boring logs; and
   h. PDF copies of all reports, workplan and other documents (the document, in its entirety [signature pages, text, figures, tables, etc.] must be saved to a single PDF file) including the signed transmittal letter and professional certification by a California Licensed Civil Engineer or a Registered Geologist.

7. Upon request, monitoring results shall also be provided electronically in Microsoft Excel® to allow for ease of review of site data, and to facilitate data computations and/or plotting that Regional Water Board staff may undertake during the review

process. Data tables submitted in electronic spreadsheet format will not be included in the case of file review and should therefore be submitted on CD and included with the hard copy of the report. Electronic tables shall include the following information:

a. Well designations;

b. Well location coordinates (latitude and longitude);

c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, screen interval elevation, and a characterization of geology of subsurface the well is located in);

d. Groundwater depths and elevations (water levels);

e. Current analytical results by constituent of concern (including detection limits for each constituent);

f. Historical analytical results (including the past five years unless otherwise requested); and

g. Measurement dates.

Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order related to surface impoundments and solid waste units, submitted by the Discharger, shall also be provided to the Contra Costa County Hazardous Materials Program**.**

8. Self-Monitoring Program**:** The Discharger shall comply with the SMP attached to this Order (Part A and Part B). The SMP is intended to constitute both a DMP and a Corrective Action Monitoring Program pursuant to Title 27, sections 20420 and 20430 and is designed to identify significant water quality impacts from the specified WMU and demonstrate compliance with the WQPS established pursuant to Title 27, Section 20390 for the WMU. The SMP may be amended as necessary at the discretion of the Executive Officer.

COMPLIANCE DATE: Immediately

9. Revision of the Self-Monitoring Program: The Discharger shall submit a plan for the revision of the monitoring locations, parameters, frequency and MACLs contained within the SMP attached to this Order (Part B).

COMPLIANCE DATE: December 15, 2011.

10. Contaminated Soil Management Plan: Chevron shall continue to implement the plan, dated August 26, 2008, for managing non-hazardous contaminated soil discovered on refinery property during subsurface investigation or excavation work. This plan includes descriptions of soil sampling, storage, and handling protocols and criteria for reusing non-hazardous contaminated soil within the refinery impacted soils.

11. Final Closure Plan for #1 Oxidation Pond Passes 2 through 5: Chevron shall continue to implement the No. 1 Oxidation Closure Plan, approved by the Regional Water

Board on April 30, 2009. The Plan proposed a final cover system for petroleum hydrocarbon contaminated soil in passes 2 through 5 of #1 Oxidation Pond. Chevron shall submit a final plan documenting the completion of this work.

COMPLIANCE DATE: December 15, 2011

12. Report of Waste Discharge: The Discharger shall submit a technical report, acceptable to the Executive Officer, describing any proposed material change in the character, location, or volume of a discharge, or in the event of a proposed change in use or development of a WMU or landfill (CWC Section 13260(c)). The technical report shall describe the project, identify key changes to the design that may impact any portion of the WMU or landfill, and specify components of the design necessary to maintain integrity of the WMU or landfill cover and prevent water quality impacts.

    COMPLIANCE DATE: 120 days prior to any material change

13. Financial Assurance: The Discharger shall submit to the Regional Water Board evidence of an irrevocable Post-closure Fund acceptable to the Executive Officer, to ensure monitoring, maintenance, and any necessary remediation actions. Every five years, for the duration of the post-closure monitoring period, the Discharger shall submit a report that includes an outline of the financial assurance mechanism and verification that the fund has been created. The fund value shall be supported by calculations, to be included with this submittal, providing cost estimates for all post-closure monitoring, maintenance, repair and replacement of WMU or landfill containment, cover, and monitoring systems.

    Additionally, cost estimates must be provided for corrective action for known or reasonable foreseeable releases that may be required for all WMUs at the facility. The fund value shall be based on the sum of these estimates. The cost estimates and funding shall be updated to reflect change to monitoring systems as they occur. The post-closure maintenance period shall extend as long as the wastes within the WMU pose a threat to water quality.

    COMPLIANCE DATE: Submitted with the 2015 Annual Report then every five years thereafter.

14. Availability: A copy of these WDRs shall be maintained by the Discharger and shall be made available by the Discharger to all employees or contractors performing work (maintenance, monitoring, repair, construction, etc.) at WMUs or groundwater containment systems. (CWC Section 13263)

15. Change in Ownership: In the event of any change in control or ownership of the facility presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Regional Water Board upon a final change in ownership. To assume operation of this Order, the succeeding owner or operator must

apply in writing to the Executive Officer requesting transfer of this Order within 30 days of the change of ownership. The request must contain the requesting entity's full legal name, mailing address, electronic address, and telephone number of the persons responsible for contact with the Regional Water Board. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. (CWC Sections 13267 and 13263)

COMPLIANCE DATE: 30 days after a change in facility control or ownership

16. Revision: This Order is subject to Regional Water Board review and updating, as necessary, to comply with changing State or federal laws, regulations, policies, or guidelines; changes in the Basin Plan; or changes in discharge characteristics. The Regional Water Board will review this Order periodically and may revise its requirements when necessary. (CWC Section 13263).

17. Submittal Revisions: Where a Discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Water Board, it shall promptly submit such facts or information. (CWC Sections 13260 and 13267)

18. Vested Rights: This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, do not protect the Discharger from liability under federal, State or local laws, nor do they create a vested right for the Discharger to continue the waste discharge. (CWC Section 13263(g))

19. Severability: Provisions of these WDRs are severable. If any provisions of these WDRs are found invalid, the remainder of these WDRs shall not be affected. (CWC 9213)

20. Operation and Maintenance: The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order. (CWC Section 13263(f))

20. Reporting of Hazardous Substance Release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it probably will be discharged in or on any waters of the State, the Discharger shall:

    a. Report such discharge to the following:

i. The Regional Water Board by calling (510) 622-2300 during regular office hours

(Monday through Friday, 8 a.m. – 5 p.m.); and to

ii. The California Emergency Management Agency (CAL EMA) at (800) 852-7550.

b. A written report shall be filed with the Regional Water Board within five working days.
The report shall describe:

i. The nature of the waste or pollutant.

ii. The estimated quantity involved.

iii. The duration of the incident.

iv. The cause of the release.

v. The estimated size of the affected area, and nature of the effect.

vi. The corrective actions taken or planned, and a schedule of those measures.

vii. The persons/agencies notified.

This reporting is in addition to reporting to CAL EMA that is required pursuant to the Health and Safety Code.

21. Reporting Releases: Except for a discharge that is in compliance with these WDRs, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, shall immediately notify CAL EMA of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the Regional Water Board of the discharge as soon as:

a. That person has knowledge of the discharge;

b. Notification is possible; and

c. Notification can be provided without substantially impeding cleanup or other emergency measures.

This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of CWC Section 13271 unless the Discharger is in violation of a prohibition in the Basin Plan. [CWC Section 13271(a)]

22. Release Reporting Requirements: In the case of a release defined above the following must be provided to the Regional Water Board within five days of knowledge of the release;

a. Site map illustrating location and approximate size of impacted area;

b. Photographs of the impacted area before and after remediation; and

c. A report detailing the remediation method chosen and its efficacy, and illustrating that the release contingency plan was effective, or else proposing modifications to the contingency plan to increase its effectiveness.

23. Endangerment of Health or the Environment: The Discharger shall report any noncompliance that may endanger human health or the environment. Any such information shall be provided orally to the Executive Officer, or authorized representative, **within 24 hours** from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Discharger becomes aware of the circumstances. The written submission shall contain:

a. A description of the noncompliance, and its cause;

b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected;

c. The anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours [CWC sections 13263 and 13267]. The following occurrences must be reported to the Executive Officer within 24 hours:

a. Any bypass from any portion of the treatment facility;

b. Any discharge of industrial products, or treated or untreated wastewater; and

c. Any treatment plant upset that causes the discharge limitation(s) of this Order to be exceeded [CWC sections 13263 and 13267].

24. Entry and Inspection: The Discharger shall allow the Regional Water Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this order or as otherwise authorized by the CWC, any substances or parameters at any location. (CWC Section 13267)

25. Discharges to Navigable Waters: Any person discharging or proposing to discharge to navigable waters from a point source (except for discharge of dredged or fill material subject to Section 404 of the Clean Water Act and discharge subject to a general NPDES permit) must file an NPDES permit application with the Regional Water Board. (CCR Title 2 Section 22357)

26. Change in Discharge: In the event of a material change in the character, location, or volume of a discharge, the Discharger shall file with this Regional Water Board a new Report of Waste Discharge. (CWC Section 13260). A material change includes, but is not limited to, the following:

    a. Addition of a major industrial waste discharge to discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the waste;

    b. Significant change in disposal method, e.g., change from a land disposal to a direct discharge to water, or change in the method of treatment which would significantly alter the characteristics of the waste;

    c. Significant change in the disposal area, e.g., moving the discharge to another drainage area, to a different water body, or to a disposal area significantly removed from the original area potentially causing different water quality or nuisance problems;

    d. Increase in flow beyond that specified in the WDRs; or

    e. Increase in area or depth to be used for solid waste disposal beyond that specified in the WDRs. (CCR Title 23 Section 2210)

27. Monitoring Devices: All monitoring instruments and devices used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices. Annually, the Discharger shall submit to the Executive Officer a written statement signed by a registered professional engineer certifying that all flow measurement devices have been calibrated and will reliably achieve the accuracy required.

    Unless otherwise permitted by the Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the State Department of Public Health. The Executive Officer may allow use of an uncertified laboratory under exceptional circumstances, such as when the closest laboratory to the monitoring location is outside State boundaries and therefore not subject to certification. All analyses shall be required to be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (40 CFR Part 136) promulgated by U.S. EPA. (CCR Title 23, Section 2230)

28. Treatment: In an enforcement action, it shall not be a defense for the Discharger that it would have been necessary to halt or to reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the Discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced, or is lost. (CWC Section 13263(f)).

29. Document Distribution: Copies of correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:

    a. Regional Water Board (all submittals);

    b. Department of Toxic Substances Control (all submittals); and

    c. Contra Costa Health Services, Hazardous Materials Programs (Soils Management Plan only).

    The Executive Officer may modify this distribution list as needed.

30. General Prohibition: Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the CWC. (H&SC Section 5411, CWC Section 13263)

31. Earthquake Inspection: The Discharger shall submit a detailed Post Earthquake Inspection Report acceptable to the Executive Officer, in the event of any earthquake generating ground shaking of Richter Magnitude 7 or greater at or within 30 miles of the refinery. The report shall describe the containment features, groundwater monitoring, and control facilities potentially impacted by the static and seismic deformations of any WMU or groundwater containment system. Damage to any waste containment facility, which may impact State waters, must be reported immediately to the Executive Officer.

    COMPLIANCE DATE: Verbally as soon as the data becomes available and in writing within 72 hours of a triggering seismic event. Any damage that may cause negative impacts to waters of the State must be reported immediately upon discovery to the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov

32. Maintenance of Records: The Discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer. Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;
b. The individuals who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individuals who performed the analyses;
e. The analytical techniques or method used; and
f . The results of such analyses.

33. This Order supersedes and rescinds Order No. 00-043.

34. This Order is subject to Regional Water Board review and updating, as necessary, to comply with changing State or federal laws, regulations or policies, or guidelines; changes in the Regional Water Board's Basin Plan; or changes in discharge characteristics.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on June 8, 2011.

_____
Bruce H. Wolfe
Executive Officer

Attachments:

Self-Monitoring and Reporting Program, Part A and B

Figure 1 - Location Map
Figure 2 - Regional Site Map with Geomorphic Boundaries
Figure 3 - Sector Boundaries
Figure 4 - Groundwater Protection System Location Map
Figure 5 - Plant 1 / Additives Plant Cap
Figure 6 - Pollard Sector
Figure 7 - Alkane Sector
Figure 8 - Landfarm/Landfill Sector
Figure 9 - Bayside Sector
Figure 10 - Effluent Sector
Figure 11 - Reclamation Sector
Figure 12 - North Yard Sector
Figure 13 - Groundwater Protection System

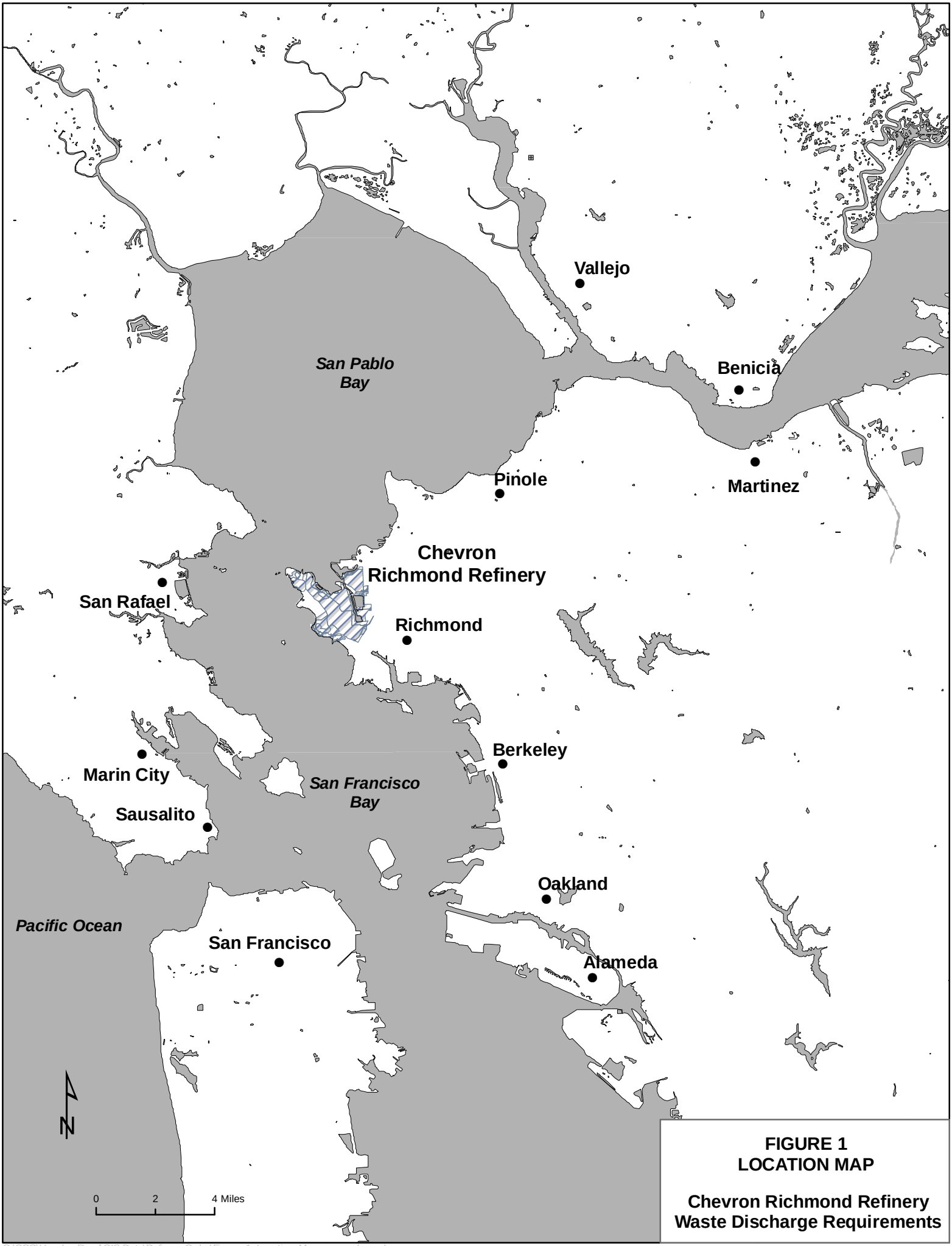


FIGURE 1
LOCATION MAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_1_Location_Map_grayscale.mxd

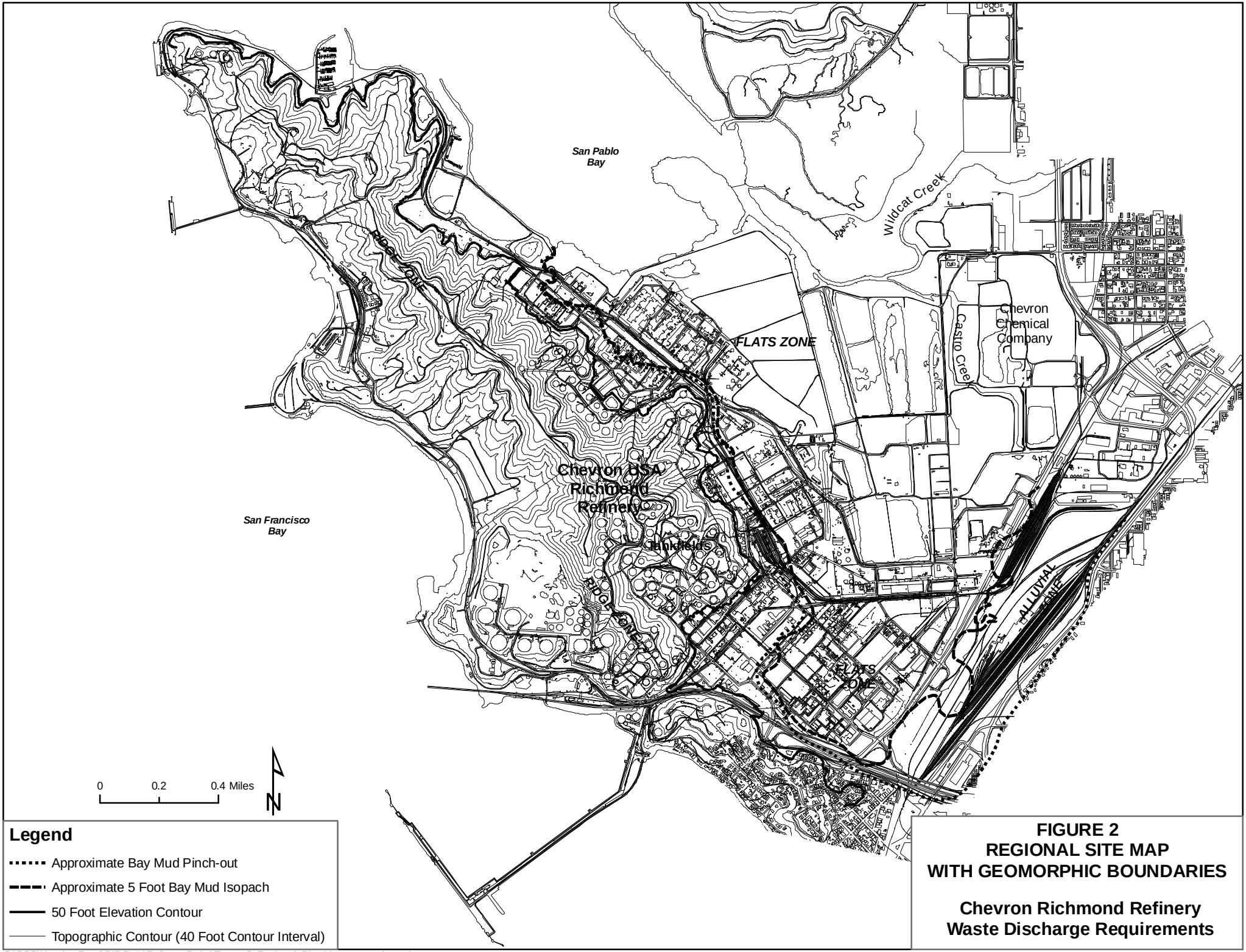


FIGURE 2
REGIONAL SITE MAP
WITH GEOMORPHIC BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_2_Regional_Site_Map_grayscale.mxd

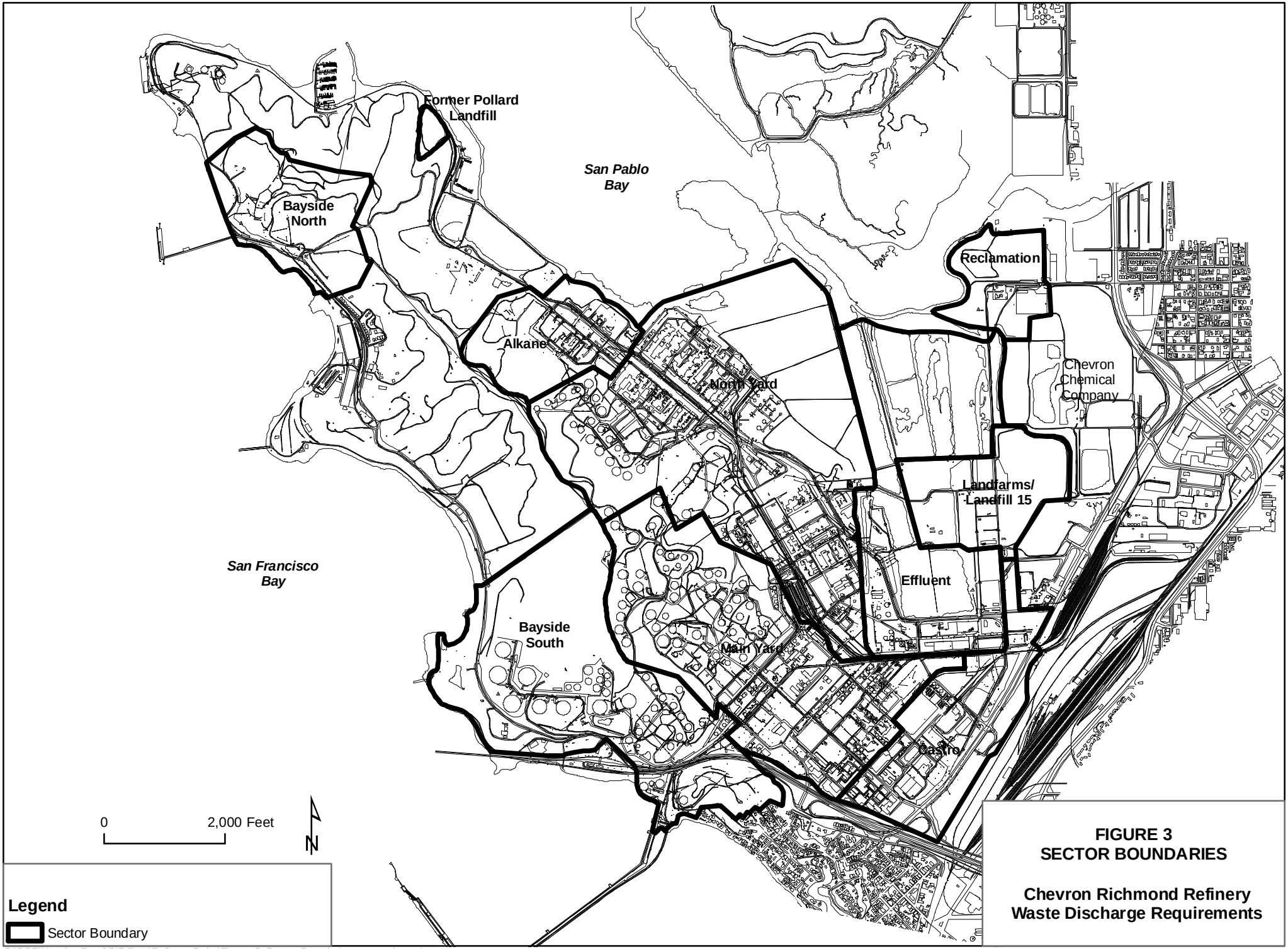


FIGURE 3
SECTOR BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

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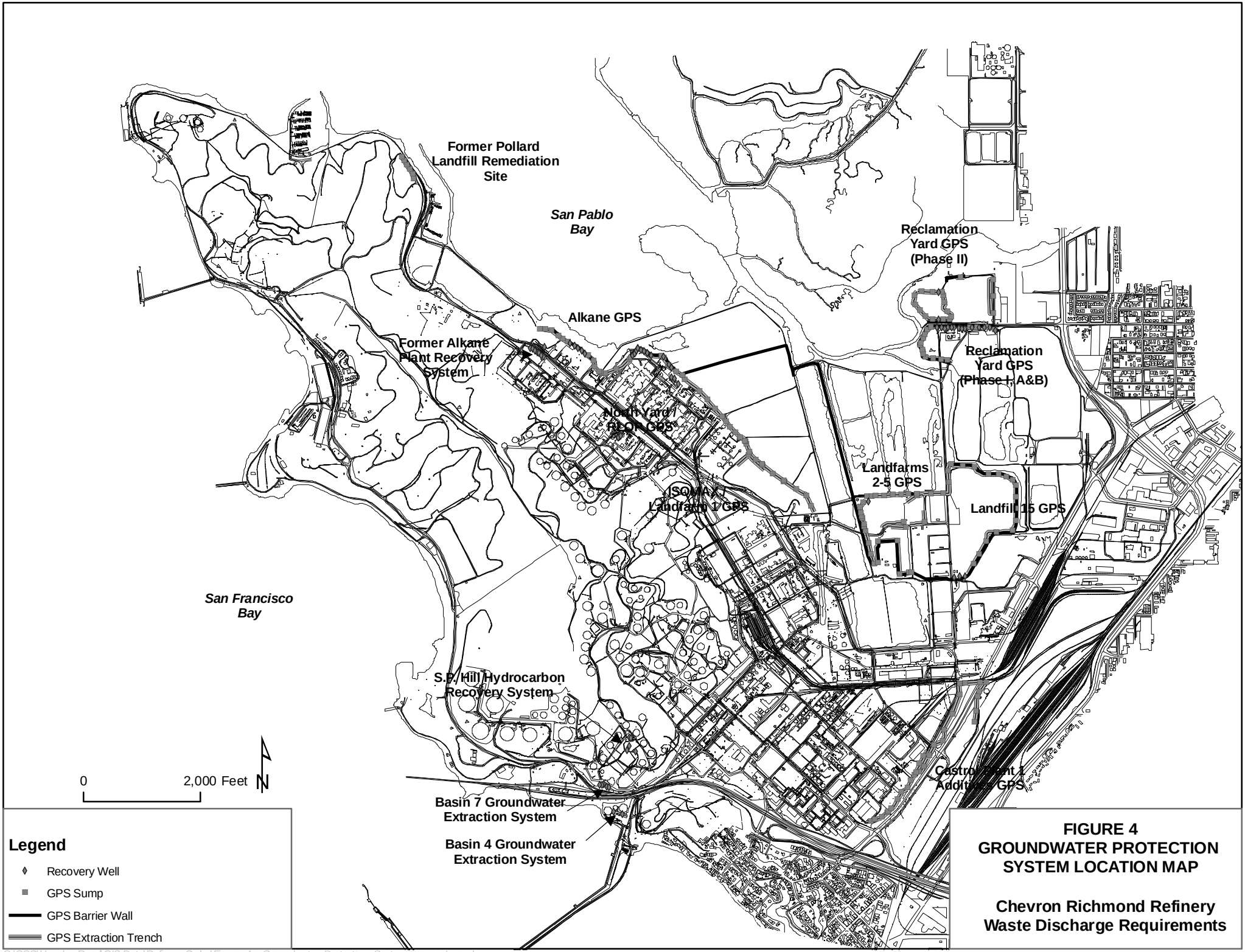
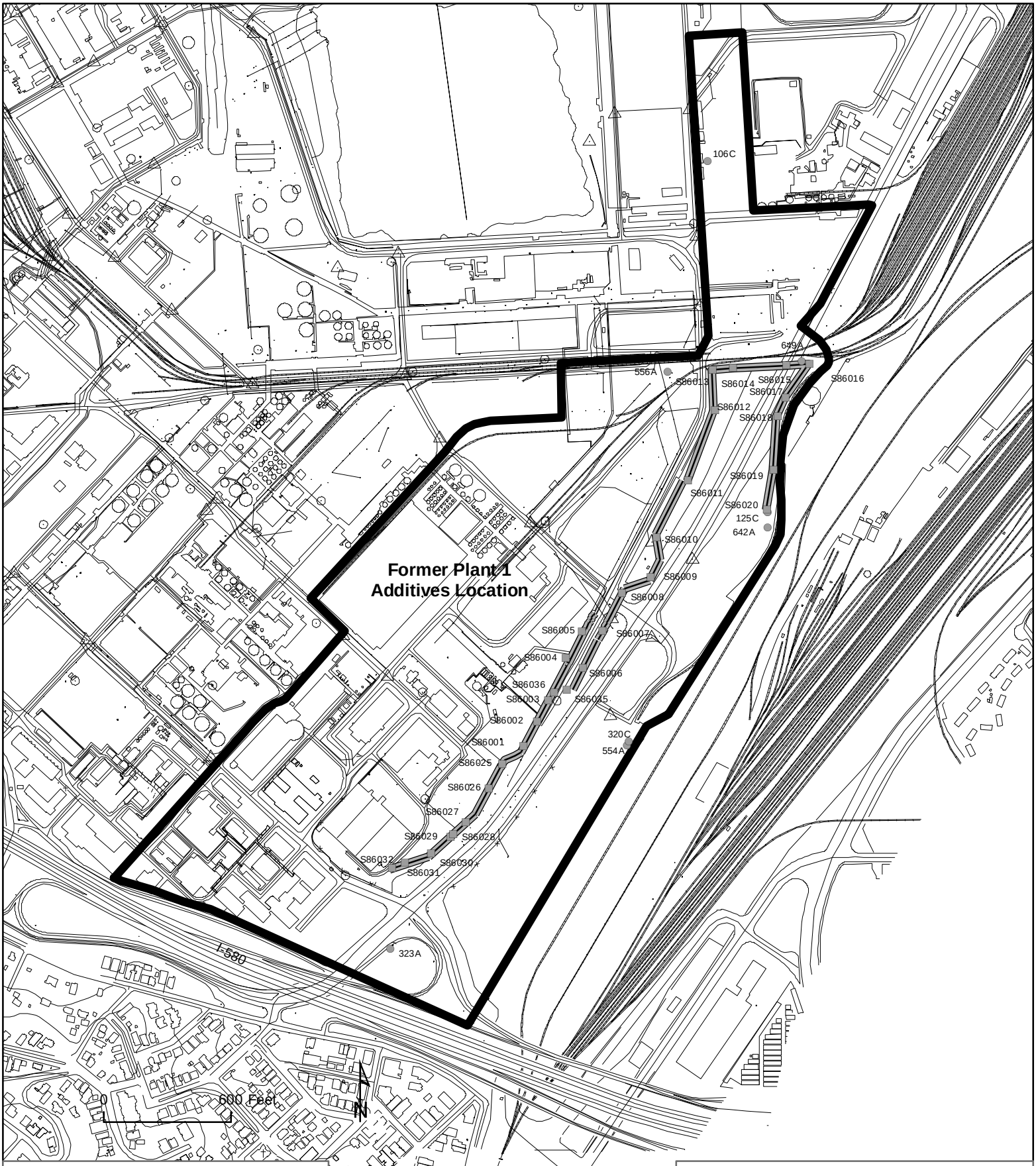


FIGURE 4
GROUNDWATER PROTECTION SYSTEM LOCATION MAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_4a_Groundwater_Protection_System_grayscale.mxd



Legend

- GPS Sump
- Monitoring Well
- GPS Extraction Trench
- Sector Boundary

FIGURE 5
PLANT 1 / ADDITIVES PLANT CAP

Chevron Richmond Refinery
Waste Discharge Requirements

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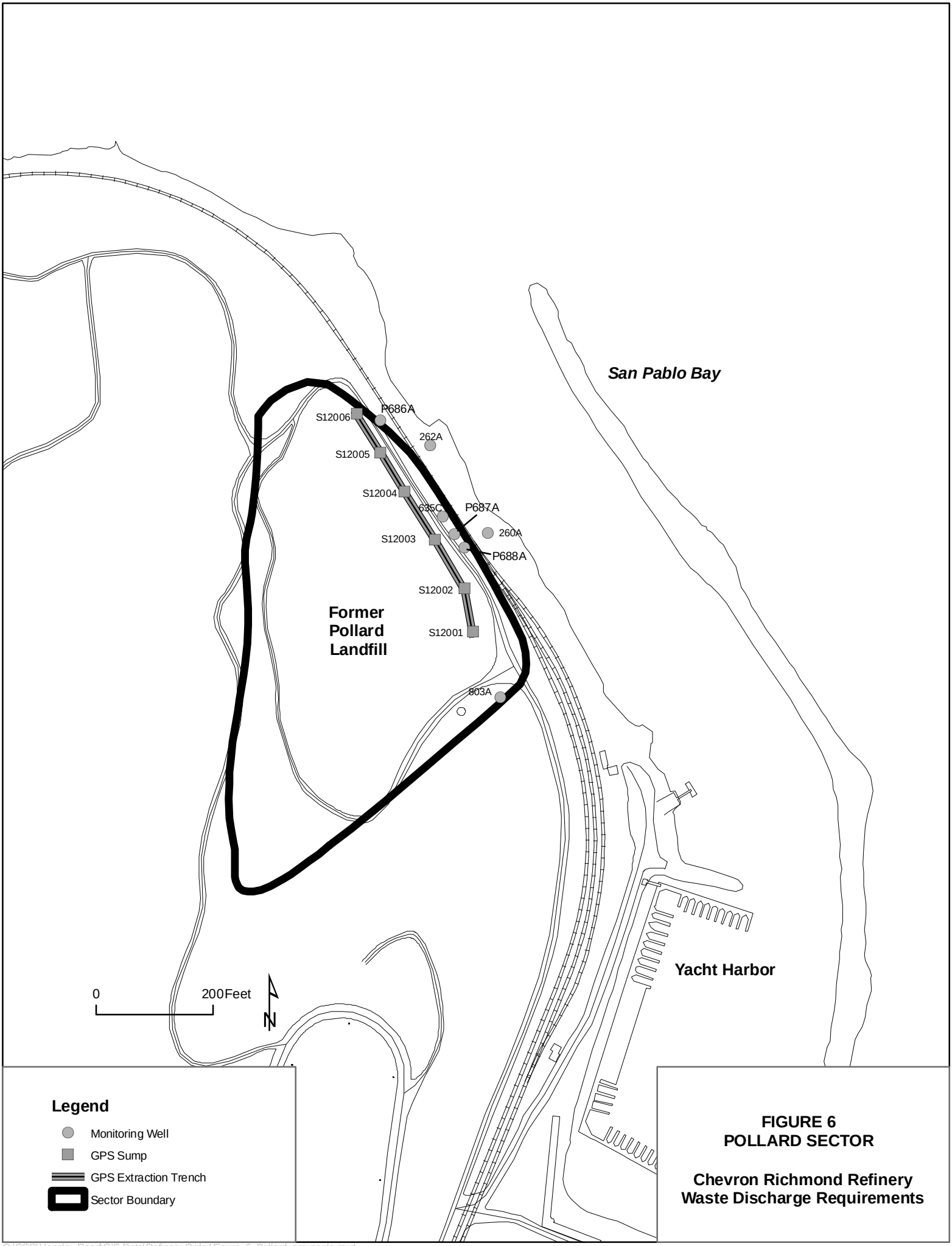

FIGURE 6
POLLARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

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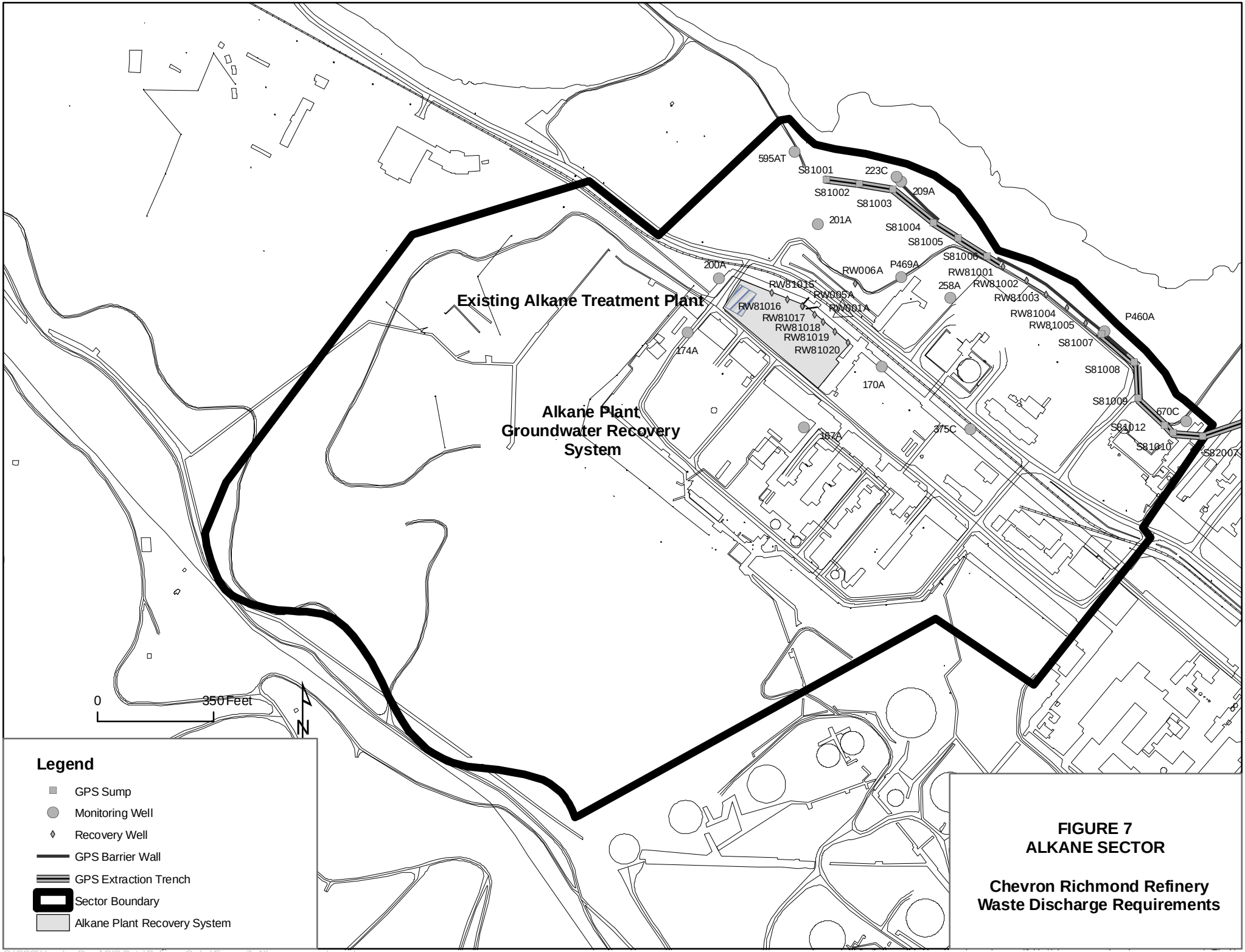

FIGURE 7
ALKANE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

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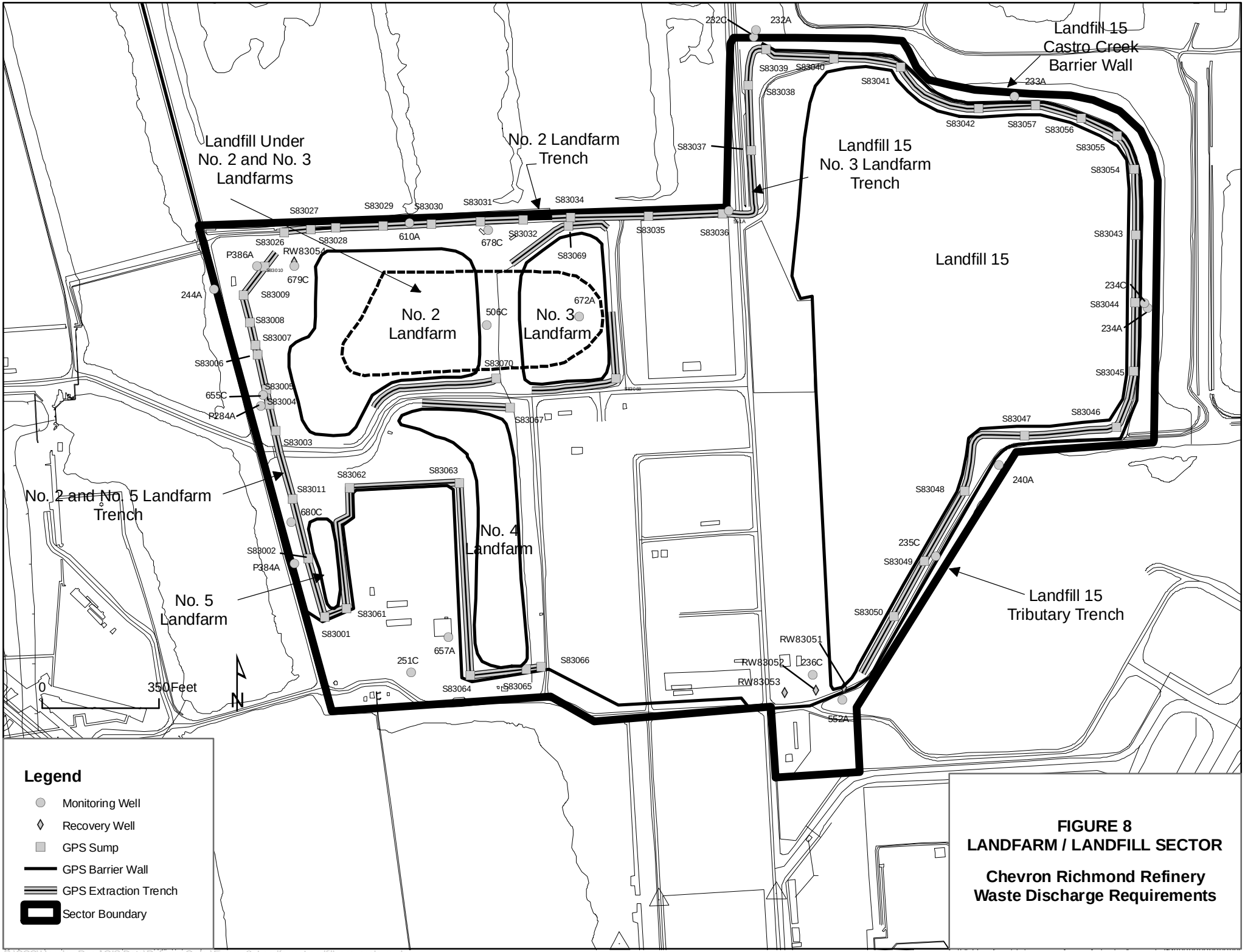

FIGURE 8
LANDFARM / LANDFILL SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

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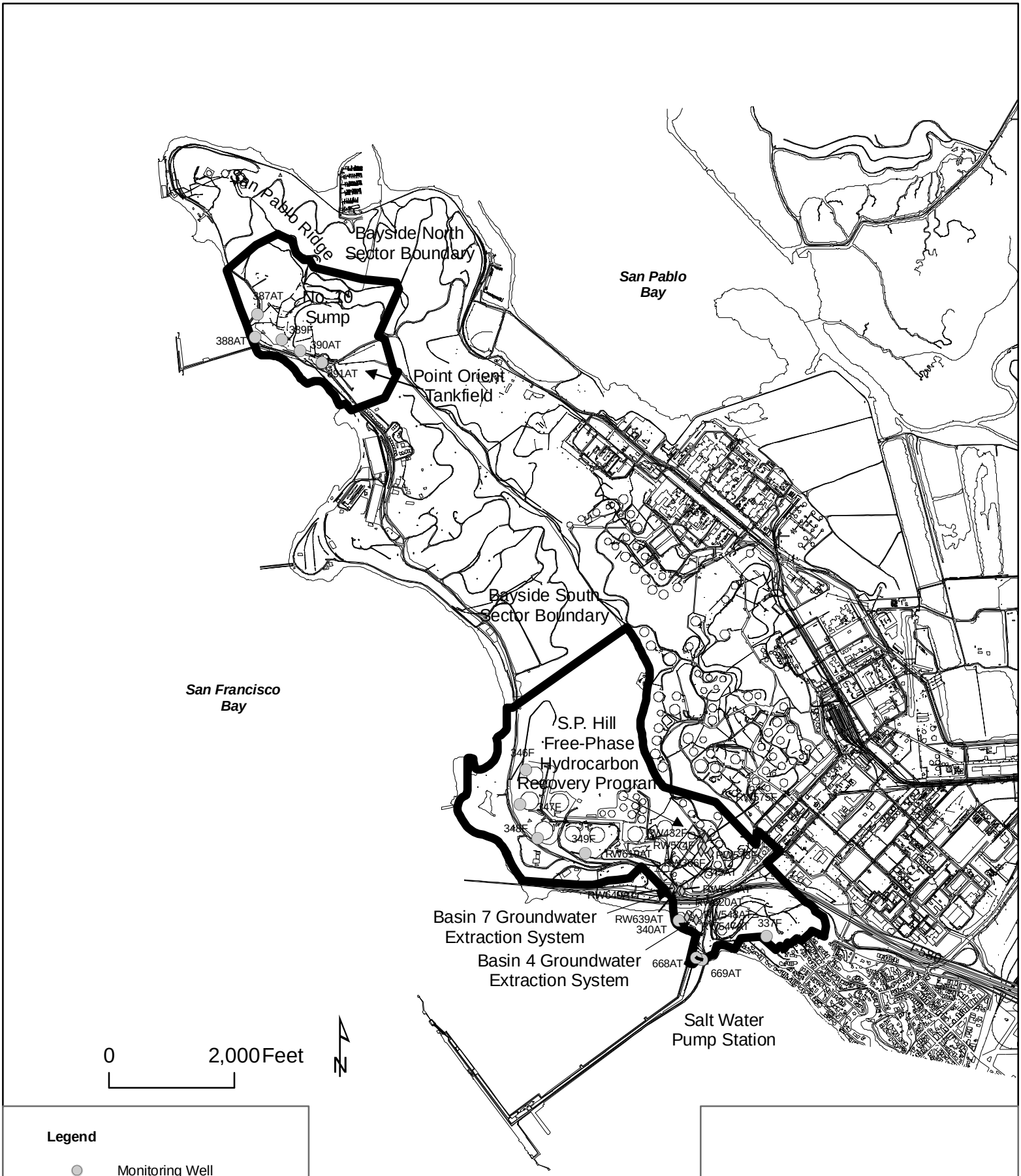


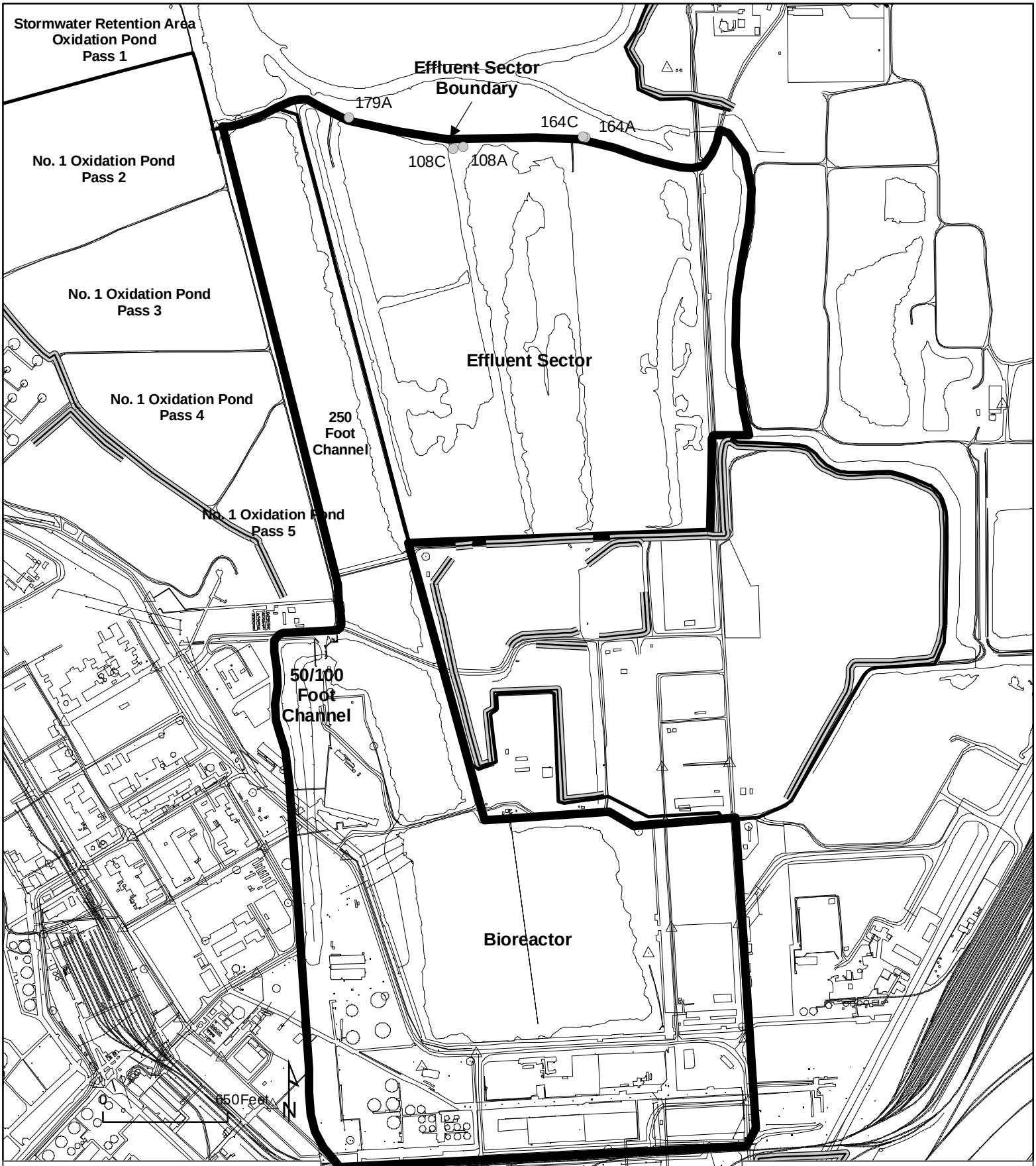
Legend

- Monitoring Well
- Bayside Recovery Well
- GPS Barrier Wall
- Sector Boundary

FIGURE 9
BAYSIDE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_9_Bayside_grayscale.mxd



Legend

- Monitoring Well
- GPS Barrier Wall
- GPS Extraction Trench
- Sector Boundary

FIGURE 10
EFFLUENT SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

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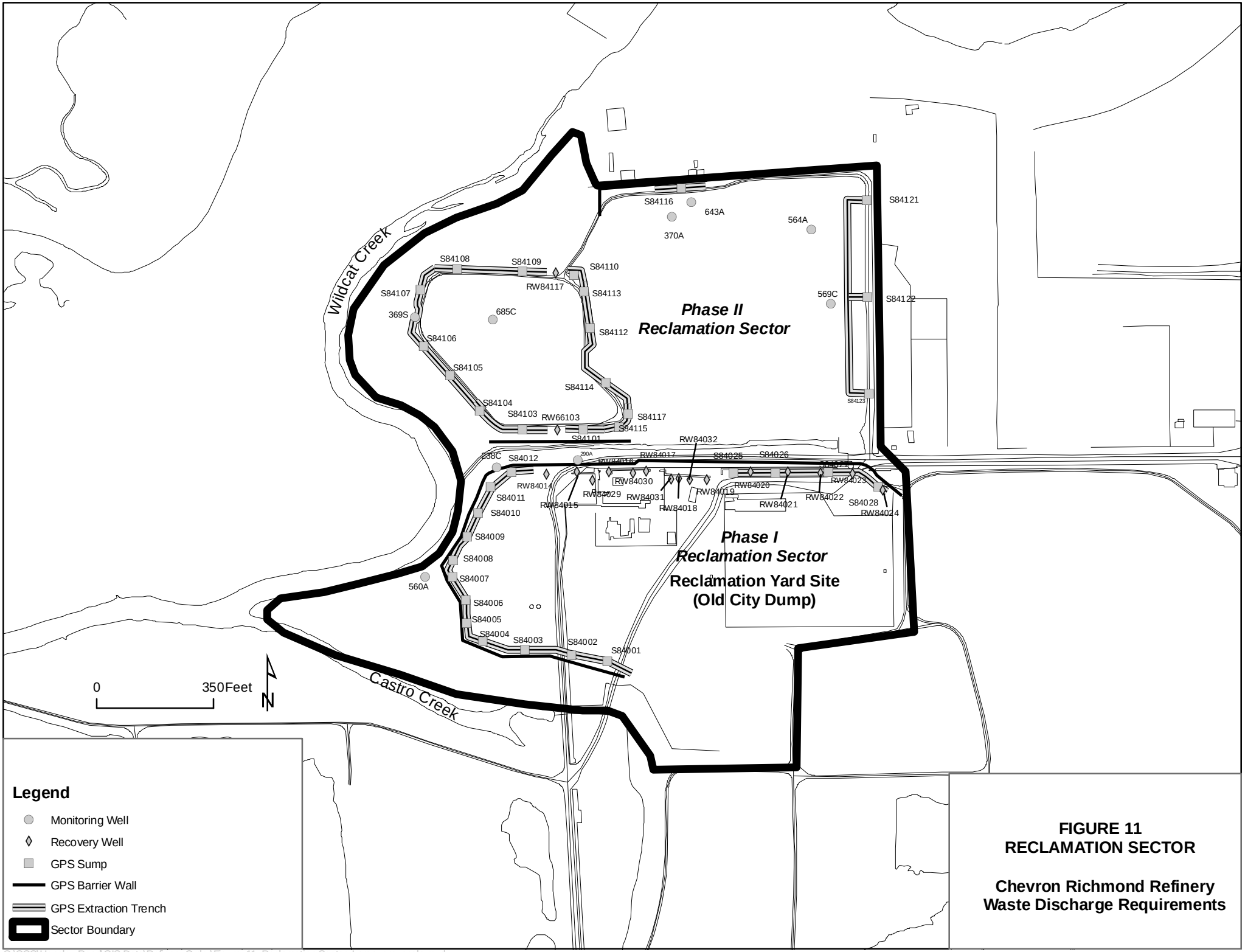


FIGURE 11
RECLAMATION SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_11_Reclamation Sector_Large_grayscale.mxd

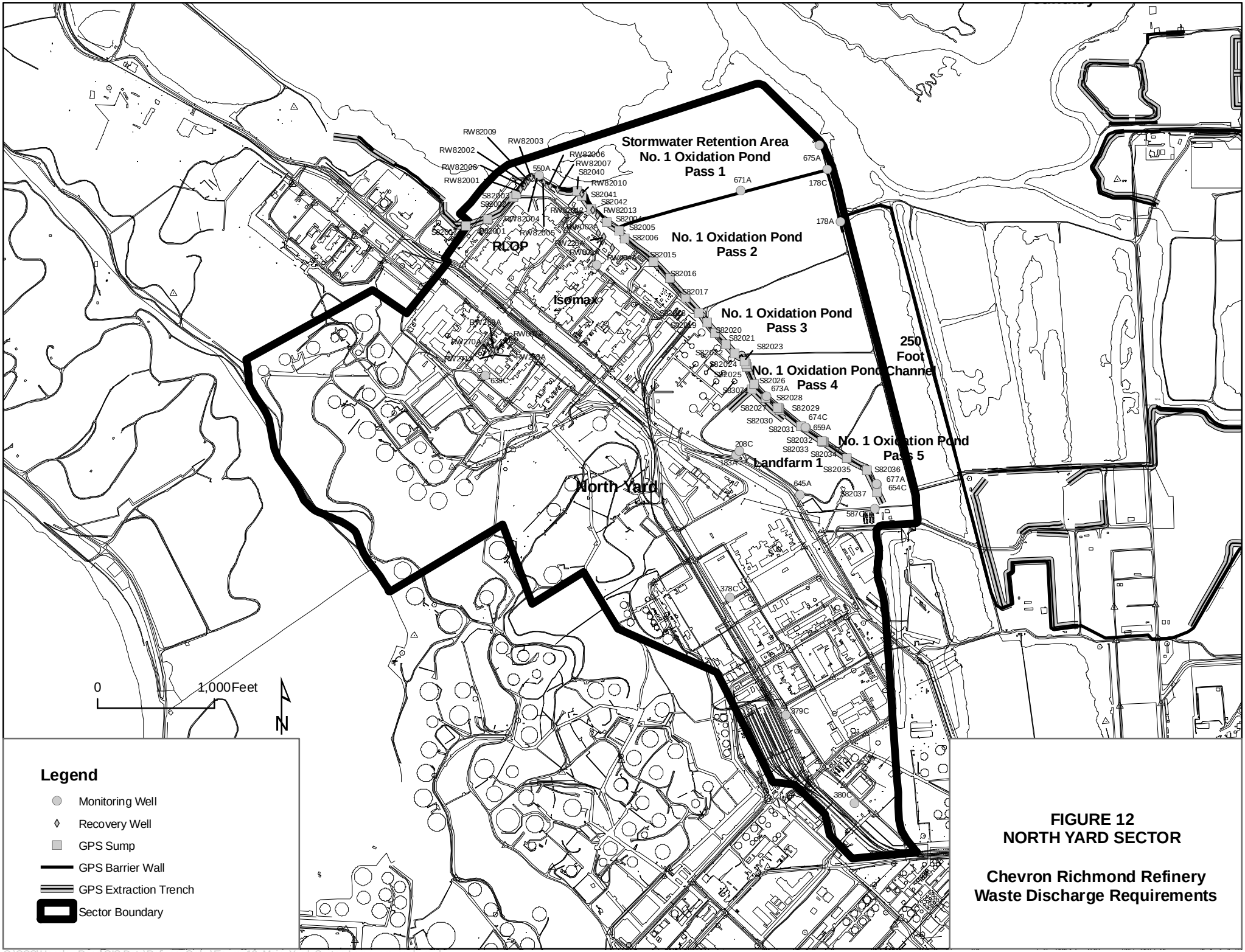
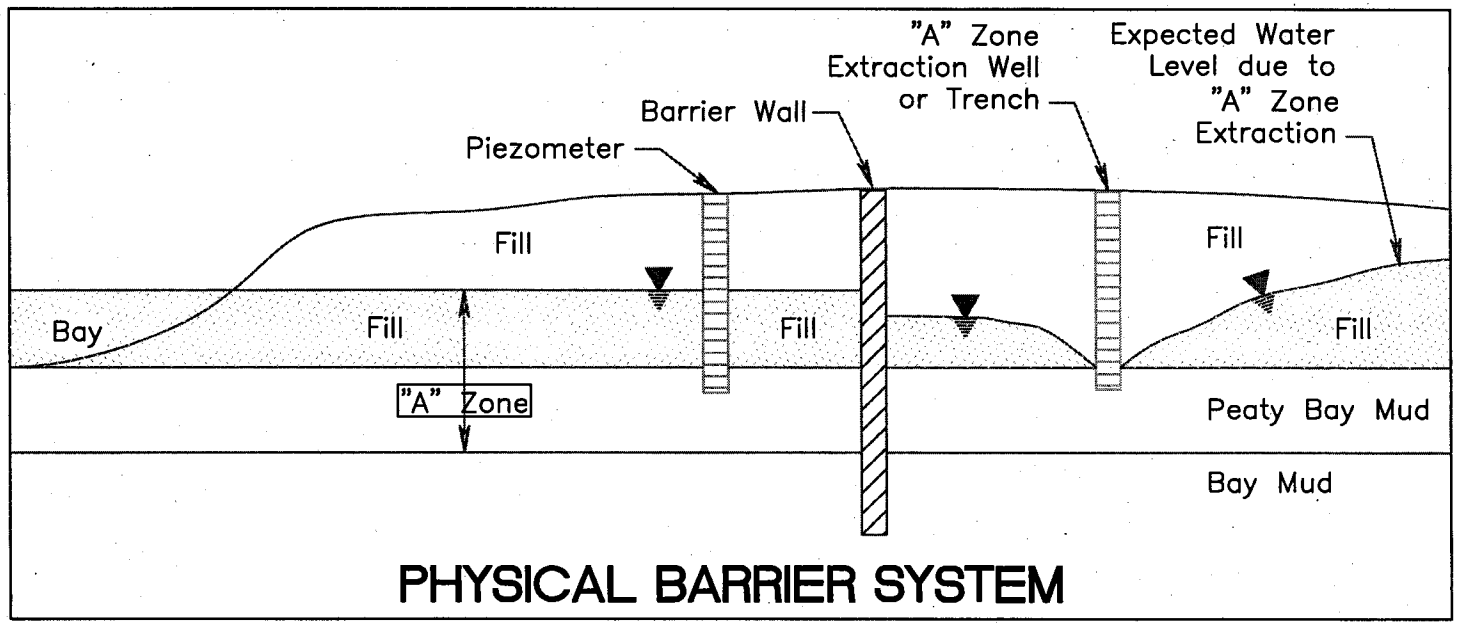
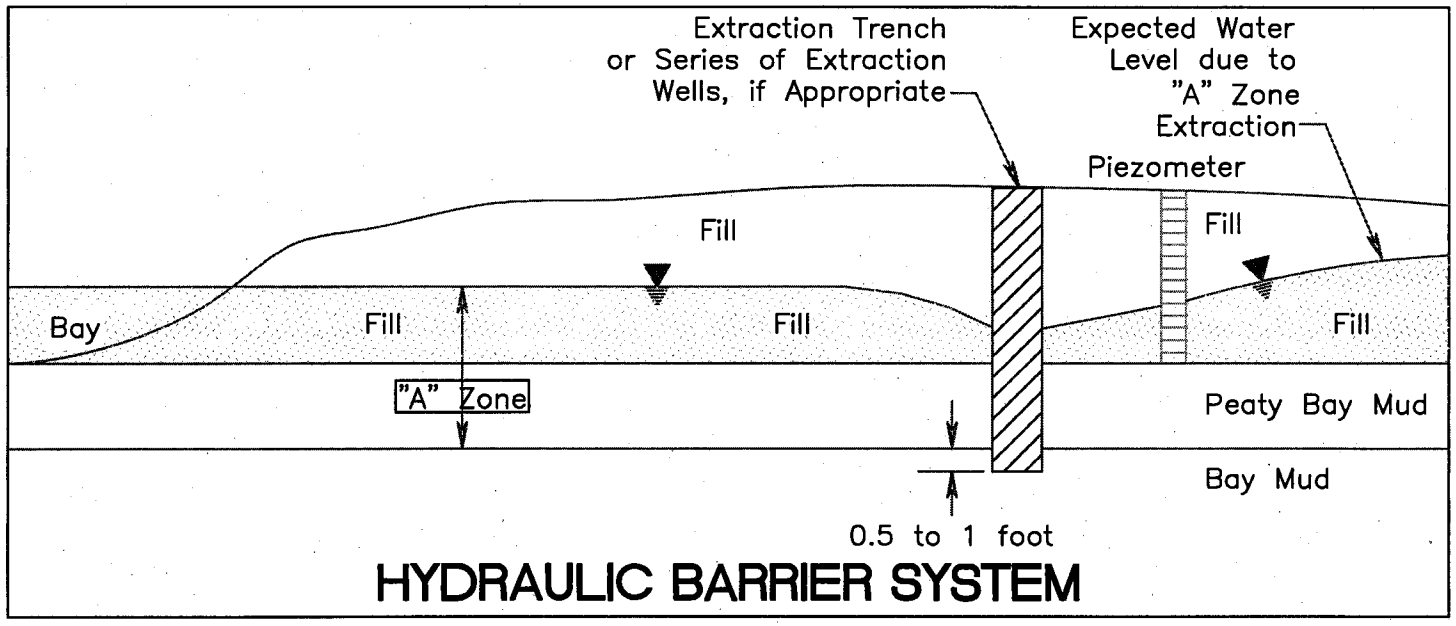


FIGURE 12
NORTH YARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_12_Main_Yard_Sector_Large_grayscale.mxd





GROUNDWATER PROTECTION SYSTEM

Chevron Richmond Refinery
Waste Discharge Requirements

Figure 3

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING AND REPORTING PROGRAM

FOR

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

ORDER NO. R2-2011-0036

CONSISTS OF PART A AND PART B

PART A

This combined Self-Monitoring Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs) and Site Cleanup Requirements (SCRs), including:

a) General monitoring requirements for landfills and waste management units under the WDRs (Part A);
b) General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
c) Self-monitoring report content and format (Part A);
d) Self-monitoring report submittal frequency and schedule (Part B);
e) Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
f) Monitoring locations, parameters, analytes and frequency for programs under the SCRs (Part B).

A. AUTHORITY AND PURPOSE

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations (CCR), Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, sections 20380 through 20435. The principal purposes of an SMP include: 1) to document compliance with WDRs and prohibitions established by the Regional Water Board, 2) to facilitate self-policing by the discharger in the prevention and abatement of pollution arising from the waste discharge, 3) to develop or assist in the development of effluent standards of performance and toxicity standards, and 4) to assist the discharger in complying with the requirements of Title 27. Additionally, under California Water Code (CWC) Section 13304, Chevron is required to implement corrective actions and monitor the effectiveness of the implemented corrective actions under this combined SMP.

B. MONITORING REQUIREMENTS

Monitoring refers to the observation, inspection, measurement, and/or sampling of environmental media, waste management units (WMUs), containment and control facilities, and waste disposed in each WMU. The monitoring programs designed to evaluate the potential release of wastes from WMUs are included in the WDRs Monitoring Program described in this combined SMP. Monitoring programs designed to evaluate the effectiveness of corrective actions implemented under CWC Section 13304 are also described in the combined SMP. The following defines the types of monitoring that may be required.

Monitoring of Environmental Media

The Regional Water Board may require monitoring of groundwater, surface water, vadose zone, stormwater, leachate, and any other environmental media that may pose a threat to water quality or provide an indication of a water quality threat at the refinery.

Sample collection, storage, and analyses shall be performed according to the most recent version of U.S. EPA-approved methods or in accordance with Groundwater Monitoring Program Standard Operating Procedures (SOP) or subsequent revisions approved by Regional Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a

California State-approved laboratory for the required analyses. The director of the laboratory whose name appears on the certification shall be responsible for supervising all analytical work in his/her laboratory and shall have signing authority for all laboratory data reports or may designate signing of all such data included in reports submitted to the Regional Water Board.

All monitoring instruments and devices used to conduct monitoring in accordance with this SMP shall be maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once every two years.

Receiving waters refer to any surface water which actually or potentially receives surface or groundwater that pass over, through, or under waste materials or impacted soils. In this case, the groundwater beneath and adjacent to the WMU areas and the surface runoff from the refinery site are considered receiving waters.

Standard Observations

Standard observations refer to observations within the limits of each WMU, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

1. Waste Management Units:
   a. Evidence of ponded water at any point on the WMU;
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

2. Perimeter of Waste Management Units:
   a. Evidence of liquid leaving or entering the WMU, estimated size of affected area and flow rate (show affected area on map);
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

3. Receiving Waters:
   a. Floating and suspended materials of waste origin, including their presence or absence, source, and size of affected area;
   b. Discoloration and turbidity: description of color, source, and size of affected area;
   c. Evidence of odors, presence or absence, characterization, source, and distance of travel form source;
   d. Evidence of beneficial use, such as presence of water associated with wildlife;
   e. Estimated flow rate; and
   f. Weather conditions, such as estimated wind direction and velocity, total precipitation.

Facilities Inspections

Facilities inspections refer to the inspection of all containment and control structures and devices associated with the environmental monitoring of the refinery. Containment and control facilities may include the following:

1. Intermediate and final covers; and
2. Storm-water management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks;

Quality Assurance/Quality Control (QA/QC) Sample Monitoring

Chevron shall collect duplicate, field blank, equipment blank (if appropriate) and trip blank samples for each monitoring event at the frequency specified in the latest version of the Groundwater Monitoring Program SOP.

C. REPORTING REQUIREMENTS

Reporting responsibilities of waste dischargers under WDRs and SCRs are specified in CWC sections 13225(a), 13267(b), 13383, and 13387(b) and this Regional Water Board's Resolution No.73-16 and Title 27. At a minimum, each Self-Monitoring Report (SMR) shall include the following information:

1. Transmittal Letter: A cover letter transmitting the essential points of the monitoring report shall be included with each monitoring report. The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

2. Graphic Presentation: The following maps, figures, and graphs (if applicable) shall be included in each SMR to visually present data collected pursuant to this SMP:
   a. Plan-view maps showing all monitoring and sampling locations, WMUs, containment and control structures, treatment facilities, surface water bodies, and site/property boundaries;
   b. Groundwater level/piezometric surface contour maps for each groundwater-bearing zone of interest showing inferred groundwater gradients and flow directions under/around each WMU, based upon the past and present water level elevations and pertinent visual observations; and
   c. Any other maps, figures, photographs, cross-sections, graphs, and charts necessary to visually demonstrate the appropriateness and effectiveness of sampling, monitoring, characterization, investigation, or remediation activities relative to the goals of this SMP.

3. Tabular Presentation: The following data (if applicable) shall be presented in tabular form and included in each SMR to show a chronological history and allow quick and easy reference:
   a. Well designation;
   b. Well location coordinates (latitude and longitude);
   c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
   d. Groundwater depths;
   e. Groundwater elevations;
   f. Current analytical results (including analytical method and detection limits for each constituent);

g. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
h. Measurement dates.

4. Compliance Evaluation Summary and Discussion:

a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections;
b. The quantity and types of wastes captured by the GPS and hydrocarbon recovery program, and the location these wastes were disposed of during the reporting period, if applicable;
c. A description of the waste stream, if applicable;
d. The signature of the laboratory director or his/her designee in laboratory data deliverables indicating that he/she has supervised all analytical work in his/her laboratory; and
e. A discussion of the field and laboratory results that includes the following information:

(1) Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
(2) Conclusions;
(3) Recommendations;
(4) Newly implemented or planned investigations and remedial measures;
(5) Data anomalies;
(6) Variations from protocols;
(7) Condition of wells; and
(8) Effectiveness of leachate monitoring and control facilities.

5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Regional Water Board staff and unless the information is already contained in an SAP or SOP approved by Regional Water Board staff:

a. New boring and well logs;
b. Method and time of water level measurements;
c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and electrical conductivity, calibration of the field equipment, pH temperature, conductivity, and turbidity measurements, and method of disposing of the purge water;
d. Sampling procedures, field, equipment, and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name of the person actually taking the samples, and any other relevant observations; and
e. Documentation of laboratory results, analytical methods, detection limits and reporting limits, and Quality Assurance/Quality Control (QA/QC) procedures for the required sampling.

D. ANNUAL REPORTING

The Discharger shall submit an annual self-monitoring report to the Regional Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information for each monitoring event during the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

1. **Graphic Presentation**
   Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

   a. Known or probable contaminant sources;
   b. Well locations;
   c. Groundwater elevation contours;
   d. Inferred groundwater flow direction(s);
   e. Identify wells containing phase-separated product;
   f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
   g. Appropriate analytical results.

   Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:

      i. Vertical and lateral extent of contamination;
      ii. Contaminant sources;
      iii. Geologic structures;
      iv. Soil lithology;
      v. Water table/piezometric surfaces;
      vi. Sample locations;
      vii. Sample analytical results; and
      viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

2. **Tabular Presentation**
   Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

   a. Well designations;
   b. Well location coordinates (latitude and longitude);
   c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
   d. Groundwater depths;
   e. Groundwater elevations;
   f. Horizontal groundwater gradients;
   g. Vertical groundwater gradients (including comparison wells from different zones);
   h. Phase-separated product elevations;
   i. Phase-separated product thickness;
   j. Current analytical results (including analytical method and detection limits for each constituent);
   k. Historical analytical results for the most recent four sampling events;
   l. Measurement dates;
   m. Groundwater extraction, including:

i. Average daily extraction rate;
ii. Total volume extracted for monitoring period;
iii. Annual cumulative total volume extracted; and

n. Estimate of contaminant volume extracted (reported in gallons) including:

i. Average daily removal rate;
ii. Total volume removed for monitoring period;
iii. Annual cumulative total volume removed.

3. **Discussion**
Provide a discussion of the field and laboratory results that includes the following information:

a. Data Interpretations;
b. Conclusions;
c. Recommendations;
d. Newly implemented or planned investigations and remedial measures;
e. Data anomalies;
f. Variations from protocols; and
g. Conditions of wells.

E. CONTINGENGY REPORTING

1. The Discharger shall report any seepage from the surface of any WMU or discharge prohibited in the WDRs or SCRs immediately after it is discovered to the Regional Water Board by calling the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov. The Discharger shall submit a written report with the Regional Water Board within five days of discovery of any discharge. The written report shall contain, at a minimum, the following information:

a. A map showing the location(s) of discharge;
b. Approximate flow rate;
c. A description of the nature of the discharge; and
d. Corrective measures underway or proposed.

2. The Discharger shall submit a written report to the Regional Water Board within seven working days of determining that a statistically significant difference occurred in the sample result compared against the historical dataset and above an approved WQPS in a perimeter segment-monitoring well. In addition, evaluation of GPS performance will be reviewed to examine the effectiveness of hydraulic control.

a. Chevron shall immediately re-sample at the compliance point where the exceedence was observed, evaluate the result against the historical dataset and re-analyze if results are not consistent with historical trends.

b. If re-sampling and analysis confirm the exceedence through statistical analysis, Chevron shall document this in the text of the next Annual Report and notify the Regional Water Board in writing within 21 days of re-sampling. In this letter, Chevron shall evaluate whether any re-sampling or additional corrective measures need to be implemented.

F. ELECTRONIC REPORTING

1. **Geotracker Requirements**
The State Water Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:
http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically to Geotracker:

a. Groundwater analytical data;
b. Surveyed locations of monitoring wells;
c. Boring logs describing monitoring well construction; and
d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

2. **Data Tables**
Upon request, monitoring results shall also be provided electronically in Microsoft Excel@ or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report.
Electronic tables shall include the following information:

a. Well designations;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths and elevations (water levels);
e. Phase-separated product thicknesses and elevations;
f. Current analytical results by constituent of concern (including detection limits for each constituent);
g. Historical analytical results (including the past four sampling events); and
h. Measurement dates.

G. MAINTENANCE OF WRITTEN RECORDS

The Discharger shall maintain information required pursuant to this SMP for a minimum of five years. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board.

PART B: MONITORING AND OBSERVATION SCHEDULE

1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS

A. GROUNDWATER MONITORING:

Semi-Annual Reports: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

Groundwater shall be sampled and analyzed as detailed in Tables 2 and 4. Monitoring well locations are listed in Tables 1 and 3. Groundwater analyses shall include the following field measurements: pH, temperature, specific conductance, water level, volume purged, number of casings volumes purged, and whether the well went dry during sampling (including measures taken to ensure accuracy of analyses given this condition). Groundwater monitoring wells installed in the future will be sampled and analyzed as detailed in Tables 2 and 4 and on a quarterly basis until a statistically significant dataset is established.

B. FACILITIES MONITORING - **Observe quarterly, report semi-annually**

Semi-Annual Report: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

The Discharger shall inspect all facilities to ensure proper and safe operation and report semi-annually. The facilities to be monitored shall include, but not be limited to:

1. Waste Containment systems;
2. Waste treatment systems;
3. Surface water retention basins;
4. Leak detection systems (where applicable); and
5. Leachate/groundwater management facilities and secondary containment where applicable.

2. GPS PERFORMANCE MONITORING

Chevron shall measure the water level in each GPS corrective action monitoring well and in a sufficient number of wells or piezometers both upgadient and downgradient of the GPS to demonstrate continuous maintenance of a hydraulic depression in the GPS trenches (inward hydraulic gradient). To demonstrate the effectiveness of the GPS, Chevron shall include the following for each refinery sector in the semi-annual SMRs:

a. contour maps of 1st and 3rd quarter GPS groundwater elevation data;
b. hydrographs showing water level data (measured at least once per week) at each operating extraction sump or recovery well;
c. a narrative summary of the GPS performance during the reporting period; and,

d. an estimate of the volume of groundwater extracted during the reporting period.

3. ON-SITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING

Closed WMUs (Plant l/Additives Plant, Landfill 15, Landfarms 1-5, the Hydropits, Parr-Richmond Landfill and the Gertrude Street Site) shall be inspected annually by a registered California engineer or geologist prior to the onset of the rainy season. These annual inspections shall include identification of areas of the final covers where the soil has become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Chevron shall perform appropriate repairs for these areas prior to the rainy season. In addition, Chevron shall monitor runoff/run-on control facilities for their effectiveness and overall condition as needed according to weather conditions during the winter months (November through April) and as prescribed in the approved post-closure maintenance/monitoring plan for each individual WMU. Chevron shall maintain records of all inspections and repairs and summarize in each semi-annual monitoring report any repairs made during the corresponding reporting period.

4. ALKANE PLANT PLUME REMEDIATION MONITORING

Chevron shall continue to monitor the Alkane Plant Plume remediation effort in accordance with *the Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001). The monitoring components of this plan include measuring potentiometric water levels, liquid hydrocarbon thickness, and benzene and fluoride concentrations. Benzene and fluoride concentrations will continue to be measured annually in samples collected from 6 wells (listed in Table 1), located around the perimeter of the plume to verify containment of the plume.

5. FREE-PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY

Chevron shall include a map in each semi-annual SMR that shows the locations of all wells within the refinery that contain FPLH. The measured thickness of the FPLH in each well should be indicated on the map next to the well. Recovery of FLPH will be performed in accordance with the procedures described in the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery* (URS, 2000). In addition, the SMR shall include a description of FPLH recovery method used, recovery volume data for the reporting period and cumulative recovery data for each active recovery well or system.

6. CHEMICAL CONSTITUENT MONITORING

a. Refinery-Wide Groundwater Monitoring Program: Chevron shall sample the Refinery-Wide Corrective Action Groundwater Monitoring Program compliance monitoring points listed in Table 1 for the analytical parameters and at the frequencies listed in Table 2. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

b. Landfarm Post-Closure Monitoring Program: Chevron shall sample the Landfarms Post-Closure Monitoring Program monitoring points listed in Table 3 for the analytical parameters and at the frequencies listed in Table 4. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

Monitoring events for constituents of concern and Appendix IX analyses shall alternate between periods of highest and lowest groundwater levels.

c. Chevron shall sample new wells installed to monitor Landfarms 1 through 5 for COCs and MPs listed in Table 4 over eight consecutive quarters. Within the first year after installation, Chevron shall analyze new wells for the Appendix IX constituents listed in Table 4. Chevron shall add any new compounds detected in new wells to the list of COCs in Table 4.

d. Chevron shall sample the monitoring points listed in Table 3 regardless of the presence of nonaqueous phase liquid as follows:

   i. For monitoring points with persistent nonaqueous phase liquid (e.g., more than two consecutive quarters), Chevron shall collect samples every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent nonaqueous phase liquid (e.g., not detected during consecutive quarters), Chevron shall collect samples semi-annually.

   ii. Chevron shall obtain samples for dissolved phase analysis after purging nonaqueous phase liquid from the well, by low-flow sampling, or by another appropriate method.

   iii. Chevron shall follow the most recent version of the Chevron Groundwater Monitoring Program Standard Operating Procedure.

e. Chevron shall monitor “A” Zone monitoring points in Table 3 under a corrective action monitoring program (22 CCR 66264.100).

f. Chevron shall monitor “C” Zone monitoring points in Table 3 under a detection monitoring program (22 CCR 66264.98).

Attachments:

Table 1:	List of Monitoring Wells by Sector, Refinery-Wide Groundwater Monitoring Program
Table 2:	Maximum Allowable Concentration Limits for Constituents of Concern and Monitoring Parameters for the Refinery-Wide Groundwater Monitoring Program
Table 3:	Landfarm Area Monitoring Well Network
Table 4:	Landfarm Post-Closure Monitoring Program, Monitoring Parameters, Constituents of Concern and MACLs

Table 1: List of Monitoring Wells by Sector
Refinery-Wide Groundwater Monitoring Program
Chevron Richmond Refinery

Alkane Sector	Castro and Plant 1/Add. Sector	Landfarms /Landfill 15 Sector	North Yard Sector	Reclamation Yard Sector	Pollard Sector	Effluent Sector	Bayside North	Bayside South	Interior "C" Zone
209A	323A	232A	178A	290A	260A	108A	387AT	346F	208C
P460A	642A	233A	675A	643A	262A	164A	388AT	347F	638C
595AT	554A	234A	550A	370A	803A	179A	389F	348F	378C
223C	556A	240A	377C	560A	635C	108C	390AT	349F	379C
375C	106C	244A	178C	685C		164C	391AT	351CT	380C
670C	125C		671A	238C				345AT	138C
167A*	320C	551A		369S				340AT	382C
170A*	649A	552A		564A				337F	
174A*		232C		569C				RW619AT#	
200A*		234C						RW534AT#	
201A*		235C							
258A*		236C							

Notes:
* Wells associated with Alkane Plant Plume Remediation Monitoring
# Wells with Remediation Monitoring Plan, S.P. Hill Tankfield

Table 2: Maximum Allowable Concentration Levels (MACLS) for Constituents of Concern and Monitoring Parameters for the Chevron Refinery -Wide Groundwater Monitoring Program

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
TPH-Gas	1200	*	S	S	S	S	S	S	S	S	S	S
TPH- Diesel	640	*	S	S	S	S	S	S	S	S		S
Benzene	46	*	S	S	S	S	S	S	S	S	B	S
MTBE	1800	*	S	S	S	S	S	S	S	S	B	S
Acenaphthene	40	*	B	B	B	B	B	B	B	B	B	
Acenaphthylene	307	*	B	B	B	B	B	B	B	B	B	
Anthracene	21	*	B	B	B	B	B	B	B	B	B	
Benzo(a)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(b)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(g,h,i)perylene		*	B	B	B	B	B	B	B	B	B	
Benzo(k)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Chrysene	0.049	*	B	B	B	B	B	B	B	B	B	
Dibenzo(a,h)anthracene	0.049	*	B	B	B	B	B	B	B	B	B	
Fluoranthene	7.1	*	B	B	B	B	B	B	B	B	B	
Fluorene	39	*	B	B	B	B	B	B	B	B	B	
Indeno(1,2,3-cd)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Naphthalene	194	*	B	B	B	B	B	B	B	B	B	
Phenanthrene	19	*	B	B	B	B	B	B	B	B	B	
Pyrene	10	*	B	B	B	B	B	B	B	B	B	
Chlordane	0.00059	*		B						B		
G-BHC (Lindane)	0.063	*		B						B		
Dieldrin	0.0019	*		B						B		
Selenium	5.0	*	B	B	B			S	B	B	B	
Arsenic	36	*	S	B					B	S		
Cadmium	9.3	*	B	B	B			B	B	B	S	B
Chromium VI	50	*	B	B	B			B	B	B	B	B
Lead	5.6	*	S	S	S	S	S	S	S	S		B
Mercury	0.025	*	B						B	B		
Nickel	8.2	*	S	B	S			S	B	S	S	S

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
Zinc	71	*	S	B	B			B	B	B	S	B
Fluoride	2400	*						S				
Un-ionized Ammonia-N	25	*							B	B		
pH	6.5 to 8.5	*	S	S	S	S	S	S	S	S	S	S
Turbidity (NTUs)	N/A	N/A	S	S	S	S	S	S	S	S	S	S
Temperature	N/A	N/A	S	S	S	S	S	S	S	S	S	S

Notes:
* MACLs to be reviewed and updated by the Discharger per Provision 9

S = Monitoring Parameter per Sector (analyzed semi-annually)
B= Constituent of concern per Section (analyzed during summer/fall reporting period every 2 years (even-numbered years)

N/A = not applicable
(NTUs) = Nephelometric Turbidity Units

Table 3
Landfarm Area Monitoring Well Network

Monitoring Wells for Landfarm Area
"A" Zone Wells
183A (POC)
610A (POC)
645A
657A
659A (POC)
672A
673A
677A
P284A (POC)
P384A
P386A
"C" Zone Wells
251C (POC)
506C (POC)
587C
654C (POC)
655C (POC)
674C
678C (POC)
679C (POC)
680C (POC)

Notes:
POC indicates that well is a point of compliance well.

Table 4
Landfarms Post-Closure Monitoring Program
Monitoring Parameters, Constituents of Concern and MACLs

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Monitoring Parameters				
pH	6.5 to 8.5	1	S	S
Specific Conductivity	N/A	N/A	S	S
Turbidity	N/A	N/A	S	S
Temperature	N/A	N/A	S	S
Arsenic	36	*	S	S
Lead	5.6	*	S	S
Nickel	8.2	*	S	S
Zinc	71	*	S	S
TPH-Gasoline	1200	*	S	S
TPH-Diesel	640	*	S	S
TPH-Diesel Silica Gel	640	*	S	S
Benzene	46	*	S	S
MTBE	1800	*	S	S
Toluene	5000	*	S	S
Phenolics (Total)	50	*	S	S
Constituents of Concern				
Cadmium, Dissolved	9.3	*	B	B
Chromium VI, Dissolved	50	*	B	B
Mercury, Dissolved	0.025	*	B	B
Selenium, Dissolved	5	*	B	B
Dissolved sulfide	100	*	B	B
Methylene Chloride	1600	*	B	B
Acenaphthene	40	*	B	S
Acenaphthylene	307	*	B	S
Anthracene	21	*	B	S
Benzo(a)anthracene	2.2	*	B	S
Benzo(a)pyrene	0.96	*	B	S
Benzo(b)fluoranthene	0.049	*	B	S
Benzo(g,h,i)perylene	X	*	B	S
Benzo(k)fluoranthene	0.049	*	B	S
Chysene	0.049	*	B	S
Dibenzo(a,h)anthracene	0.049	*	B	S
Fluoranthene	7.1	*	B	S
Fluorene	39	*	B	S
Indeno(1,2,3-cd)pyrene	0.049	*	B	S
Naphthalene	194	*	B	S
Phenanthrene	19	*	B	S
Pyrene	10	*	B	S
Pentachlorophenol	7.9	*	B	B

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Benzenethiol	5	*	B	B
Benzyl Butyl phthalate	5200	*	B	B
Bis 2-ethylhexyl phthalate	6	*	B	B
Chromium, dissolved	50	*	B	B
Di-n-butyl phthalate	12000	*	B	B
2,4-dimethylphenol	110	*	B	B
Ethylbenzene	29000	*	B	B
1-methylnapthalene	75	*	B	B
7,12-dimethyl benzo(a)anthracene	X	*	B	B
2-methylphenol	XX	*	B	B
3,4-methylphenol	XX	*	B	B
Phenol	2560	*	B	B
Trichloroethene	381	*	B	B
1,1,1-trichloroethane	62	*	B	B
Chlorobenzene	21000	*	B	B
Methyl chrysene	X	*	B	B
Total Xylenes	13	*	B	B
2-methylnaphthalene	2.1	*	B	B
Acetophenone		*	B	B
Barium	1000	*	B	B
Cobalt	3	*	B	B
Copper	3.1	*	B	B
N-Nitrosopiperidine		*	B	B
Silver	0.19	*	B	B
Vanadium	19	*	B	B
Vinyl chloride	3.8	*	B	B
Appendix IX Parameters (3)				
Metals (Methods 6010,7060, 7470)	N/A	N/A	(4)	N/A
SVOCs (Method 8270)	N/A	N/A	(4)	N/A
VOCs (Method 8260)	N/A	N/A	(4)	N/A

Notes:
* MACLs to be reviewed and updated by the Discharger per Provision 9

1. SF Bay Basin Plan, 2010
2. MACL is the maximum allowable concentration limit. Applicable to A-Zone wells only. C-Zone wells evaluated based on background concentrations of inorganic constituents and practical quantization limits for organic constituents.
3. Parameters are listed in Appendix IX to 22CFR 66264 for analysis via Methods 6010, 7060, 7470, 8260, 8270. Appendix IX parameters that are detected, but are not COCs, will be added to the list of COCs for all wells.
4. Bi-annually at POC wells. Every five years at all other wells. Within first year in new wells.
5. Monitoring for COCs and Appendix IX parameters will alternate between highest and lowest groundwater levels.

X=Total PAH concentration less than 0.015 mg/l
XX=Total phenolics concentration less than 0.05 mg/l
PAHS are polynuclear aromatic hydrocarbons
POC is point of compliance
B is biennial or monitoring every other year for non-POC wells
S is semi-annual monitoring at all wells
N/A is not applicable

California Regional Water Quality Control Board
San Francisco Bay Region

Linda S. Adams
Acting Secretary for Environmental Protection

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Edmund G. Brown, Jr.
Governor

ORDER NO. R2-2011-0049
NPDES NO. CA0005134

The following Discharger is subject to waste discharge requirements as set forth in this Order.

Table 1. Discharger Information

Discharger	**Chevron Products Company, a division of Chevron U.S.A. Inc.** **Chevron Chemical Company LLC, and** **General Chemical**
Name of Facility	Richmond Refinery
Facility Address	841 Chevron Way
	Richmond, CA 94801
	Contra Costa County
The United States Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

Discharges by the Discharger from the discharge points identified below are subject to waste discharge requirements as set forth in this Order.

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Treated wastewater	37º 58’ 15” N	122º 25’ 45” W	San Pablo Bay
002	Richmond Long Wharf	37º 55’ 15” N	122º 24’ 30” W	San Francisco Bay
003	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
004	Stormwater	37º 57’ 15” N	122º 24’ 45” W	San Francisco Bay
005	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
006	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
007	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
008	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
009	Stormwater	37º 56’ 00” N	122º 24’ 15” W	San Francisco Bay
010	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
011	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
012	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
013	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
014	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
015	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
016	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay
017	Stormwater	37º 55’ 45” N	122º 24’ 30” W	San Francisco Bay
018	Stormwater	37º 55’ 45” N	122º 24’ 00” W	San Francisco Bay
019	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
020	Stormwater	37º 57’ 15” N	122º 23’ 15” W	Castro Creek to San Pablo Bay
021	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
022	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
023	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay

Table 3. Administrative Information

This Order was adopted by the Regional Water Board on:	**July 13, 2011**
This Order shall become effective on:	**September 1, 2011**
This Order shall expire on:	**August 31, 2016**
The Discharger shall file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	**180 days prior to the Order expiration date**

I, Bruce H. Wolfe, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on July 13, 2011.

_____

Bruce H. Wolfe**,** Executive Officer

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I. FACILITY INFORMATION

The following Discharger is subject to the waste discharge requirements as set forth in this Order:

Table 4. Facility Information

Discharger	**Chevron Products Company, a division of Chevron U.S.A. Inc. Chevron Chemical Company LLC, and General Chemical**
Name of Facility	Richmond Refinery
Facility Address	841 Chevron Way Richmond, CA 94801 Contra Costa County
Facility Contact, Title, Phone No.	Michael E. Coyle, General Manager, (510) 242-4400
Mailing Address	P.O. Box 1272, Richmond, CA 94802
Type of Facility	Petroleum Refinery
Facility Flow	Discharge Point No. 001: 27.5 million gallons per day (MGD) (maximum reported daily flow); 6.6 MGD (long-term average flow)

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds:

A. Background. Chevron Products Company, a division of Chevron U.S.A. Inc., Chevron Chemical Company LLC, and General Chemical Corporation (hereinafter Discharger) are currently discharging under Order No. R2-2006-0035 (hereinafter previous Order) and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0005134. Order No. R2-2006-0035 was amended by Order No. R2-2010-0057 which amended requirements for selenium. The Discharger submitted a Report of Waste Discharge dated December 7, 2010, and applied for a reissuance of its NPDES permit to discharge treated industrial wastewater from its wastewater treatment plant, to San Pablo Bay. Further, stormwater and authorized non-stormwater discharges are discharged through 23 discharge locations throughout the Richmond Refinery (hereinafter, Facility) to San Pablo Bay and San Francisco Bay. The discharge is also currently regulated under Order No. R2-2007-0077 (NPDES Permit CA0038849) amended by Order No. R2-2011-0012, which supersedes all requirements on mercury and PCBs from wastewater discharges in the region. This Order does not affect the mercury and PCBs permit.

For purposes of this Order, references to the “Discharger” or “Permittee” in applicable federal and State laws, regulations, plans, or policies are held to be equivalent to references to the Discharger herein.

B. Facility Description. The Discharger owns and operates a petroleum refinery that from May 2007 through April 2008 had a crude-run throughput of approximately 244,000 barrels per day (bbls/day). This Order regulates the discharge of effluent from the Discharger’s wastewater treatment system, and the discharges of all stormwater associated with industrial activity from the Facility to San Pablo Bay and San Francisco Bay.

The Discharger owns and operates a wastewater treatment plant. The treatment system includes three oil and water separators that operate in parallel and treat various process wastewaters throughout the Facility. From the three oil and water separators, wastewater is routed to a bioreactor that consists of four quadrants. The first two quadrants provide biological treatment through aeration, while the next two quadrants are used as settling basins. After the settling basins, the Discharger routes a portion of bioreactor effluent to a water enhancement wetland (Wetland). The remaining bioreactor effluent, and typically all Wetland effluent is routed through granular activated carbon (GAC) before discharge through a deepwater diffuser (average depth of 30 to 50 feet) into San Pablo Bay, approximately 2,000 feet offshore north of Point San Pablo (E-001). The Discharger has the option to discharge a portion of Wetland effluent directly to Discharge Point No. 001 (downstream of the GAC facility) provided Wetland effluent discharges do not exceed a daily maximum of 3 MGD, and do not cause acute toxicity. Attachment B provides a topographic map of the area around the Facility. Attachment C provides a flow schematic of the Facility.

1. **Industrial Recycled Water Use:** The Regional Water Board supports the use of recycled water to minimize the use of fresh potable water. The Discharger utilizes recycled water that has received biological treatment to test its firewater lines. In addition to the use of water drawn from the firewater lines in the fire protection and safety systems (including emergency and non-emergency use), the Discharger also uses firewater in its process, storage, and material transfer areas and routes it back into the wastewater treatment system. During storm events, some firewater may commingle with stormwater runoff. Firewater may also be used for dust control and landscape maintenance within the Facility.

2. **Municipal Recycled Water Use:** The East Bay Municipal Utility District (EBMUD) owns and operates the North Richmond Water Reclamation Plant, which provides tertiary treatment of West County Wastewater District's secondary effluent, to provide high quality recycled water to the Discharger. Further, EBMUD owns and operates the Richmond Advanced Recycled Expansion Facility (RARE), which is located at the Discharger's facility. The RARE facility treats secondary treated effluent from West County Wastewater District onsite with microfiltration and reverse osmosis units. The Discharger uses the recycled water for such things as cooling tower make-up water, boiler make-up water, and landscape irrigation. Recycled water that is used for recycled water pipeline maintenance and cooling-water start-up activities may be discharged directly to the Discharger's wastewater treatment system.

C. Legal Authorities. This Order is issued pursuant to Clean Water Act (CWA) section 402 and implementing regulations adopted by the USEPA, and California Water Code (CWC) Chapter 5.5, Division 7 (commencing with section 13370). It shall serve as an NPDES permit for the point source discharges identified in Table 2. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC Article 4, Chapter 4, Division 7 (commencing with section 13260).

D. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through E and G are also incorporated into this Order.

E. California Environmental Quality Act (CEQA). Pursuant to CWC section 13389, this action to adopt an NPDES permit is exempt from CEQA provisions.

F. Technology-Based Effluent Limitations. CWA section 301(b) and NPDES regulations at Title 40 of the Code of Federal Regulations (CFR) Section 122.44 require permits, at a minimum, to include conditions meeting applicable technology-based requirements and any more stringent effluent limitations necessary to meet applicable water quality standards. Discharges authorized by this Order must meet technology-based requirements USEPA established at 40 CFR 419, *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category*, as well as technology-based requirements established using Best Professional Judgment (BPJ) pursuant to 40 CFR 125.3. A detailed discussion of the development of the technology-based effluent limitations in this Order is included in the Fact Sheet.

G. Water Quality-Based Effluent Limitations. CWA section 301(b) and NPDES regulations at 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements when necessary to achieve applicable water quality standards.

NPDES regulations at 40 CFR 122.44(d)(1)(i) mandate that permits include effluent limitations for all pollutants that are or may be discharged at levels that have a reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed State criterion or policy interpreting the State's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

H. Water Quality Control Plans. *The Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), USEPA, and the Office of Administrative Law (OAL), as required.

The Basin Plan implements State Water Board Resolution No. 88-63, which establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply (MUN). Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in San Francisco Bay commonly (and often significantly) exceed 3,000 mg/L and thereby meet an exception to State Water Board Resolution No. 88-63. The designation MUN does not apply to San Pablo Bay. Beneficial uses described by the Basin Plan and applicable to San Pablo Bay and San Francisco Bay are listed in Table 5. Requirements of this Order implement the Basin Plan.

Table 5. Beneficial Uses of Receiving Waters

Discharge Point(s)	Receiving Water Name	Beneficial Uses
001, 003, 008, 010 – 014, and 020 – 023	San Pablo Bay	Industrial Service Supply (IND) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)
002, 004 – 007, 009, and 017 – 019	San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PRO) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives, and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

I. National Toxics Rule (NTR) and California Toxics Rule (CTR). USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995, and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that applied in the State. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

J. State Implementation Policy. On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria USEPA promulgated for California through the NTR and to the priority pollutant objectives the Regional Water Board established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria the USEPA promulgated through the CTR. On February 24, 2005, the State Water Board adopted amendments to the SIP that became effective on July 13, 2005. The SIP establishes implementation provisions

for priority pollutant objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. Compliance Schedules and Interim Requirements. The State Water Board adopted Resolution No. 2008-0025 on April 15, 2008, titled *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits*. Under limited circumstances, this policy allows the Regional Water Board to grant a compliance schedule based on a Discharger's request and demonstration that it is infeasible to comply immediately with certain effluent limitations. This policy became effective on August 27, 2008. This Order does not include a compliance schedule or interim effluent limitations.

L. Alaska Rule. On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and tribal water quality standards become effective for CWA purposes [65 Fed. Reg. 24641 (April 27, 2000) (codified at 40 CFR 131.21)]. Under the revised regulation (also known as the Alaska Rule), USEPA must approve new and revised standards submitted to USEPA after May 30, 2000, before they can be used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

M. Stringency of Requirements for Individual Pollutants. This Order contains both technology-based effluent limitations and WQBELs for individual pollutants. This Order's technology-based pollutant restrictions implement the minimum applicable federal technology-based requirements. In addition, this Order contains effluent limitations more stringent than the minimum federal technology-based requirements as necessary to meet water quality standards. These limitations are not more stringent than required by the CWA.

WQBELs have been derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The procedures for calculating the individual WQBELs for priority pollutants are based on the SIP, which was approved by USEPA on May 18, 2000. All beneficial uses and water quality objectives in the Basin Plan were approved under State law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless applicable water quality standards for purposes of the CWA pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement CWA requirements.

N. Antidegradation Policy. 40 CFR 131.12 requires that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution No. 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law and requires that the existing quality of receiving waters be maintained unless degradation is justified based on specific findings. The Basin Plan incorporates by reference and implements both the State and federal antidegradation policies. As discussed in the Fact Sheet, the permitted

discharges are consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16.

O. Anti-Backsliding Requirements. CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be at least as stringent as those in the previous Order, with some exceptions where limitations may be relaxed. Some effluent limitations in this Order are less stringent than those in the previous Order. As discussed in the Fact Sheet, the permitted discharge is consistent with the CWA anti-backsliding requirements and federal regulations.

P. Monitoring and Reporting. 40 CFR 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. CWC sections 13267 and 13383 authorize the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (Attachment E) establishes monitoring and reporting requirements to implement federal and State requirements.

Q. Standard and Special Provisions. Attachment D contains standard provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42. The Discharger must comply with all Standard Provisions and with those additional conditions that apply pursuant to 40 CFR 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Discharger. The Fact Sheet provides rationales for the special provisions.

R. Provisions and Requirements Implementing State Law. There are no provisions or requirements in this Order that implement State law only.

S. Notification of Interested Parties. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the discharge and has provided them with an opportunity to submit written comments and recommendations. The Fact Sheet provides details regarding the notification.

T. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharges authorized by this Order. Details of the Public Hearing are provided in the Fact Sheet.

IT IS HEREBY ORDERED, that this Order supersedes Order No. R2-2006-0035, as amended, except for enforcement purposes, and, in order to meet the provisions contained in CWC Division 7 (commencing with section 13000) and regulations adopted thereunder, and CWA provisions and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

III. DISCHARGE PROHIBITIONS

A. Discharge of wastewater at a location or in a manner different from that described in this Order is prohibited.

B. The discharge of treated wastewater through Discharge Point No. 001 at any point at which the treated wastewater does not receive an initial dilution of at least 34:1 is prohibited. The

Discharger may reuse a portion of its biologically treated wastewater for onsite landscape irrigation or in the Facility's firewater system, including the Richmond Long Wharf Fire Protection System.

C. The bypass of untreated or partially-treated process wastewater to waters of the United States is prohibited, except as provided for in sections I.G.2 and I.G.4 of Attachment D to this Order and as noted in Prohibition B and Finding B.

D. The discharge of stormwater runoff from the former Chevron Chemical Company Hensley Street Plant site (drainage area for Discharge Point No. 011) to waters of the State is prohibited unless the following conditions occur: during any wet season in which a rainfall event occurs that yields a 24-hour precipitation with a return frequency of 25 years, an amount of stormwater may be discharged equal to that attributable to the precipitation occurring in excess of the 25-year rain fall event.

E. The discharge of stormwater from the Integrated Wastewater Pond (drainage area for Discharge Point No. 013) is prohibited except when it has been demonstrated to the satisfaction of the Executive Officer it contains only stormwater that will not cause or contribute to an exceedances of water quality standards. This demonstration must include measures to ensure that any synthetically-lined surface impoundment is adequately decontaminated.

F. The direct discharge of Wetland effluent to Discharge Point No. 001 (downstream of the GAC facility) is prohibited, unless the Discharger complies with Provision VI.C.4.d of this Order.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point No. 001

1. Technology-Based Effluent Limitations

a. The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001 as described in the attached Monitoring and Reporting Program (MRP) (Attachment E).

Table 6a. Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations	
		Average Monthly	Maximum Daily
Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C)	lbs/day	5,800	11,000
Total Suspended Solids (TSS)	lbs/day	4,800	7,600
Chemical Oxygen Demand (COD)	lbs/day	40,000	78,000
Oil and Grease	lbs/day	1,800	3,400
	mg/L	8	15

Parameter	Units	Effluent Limitations	
		Average Monthly	Maximum Daily
Phenolic Compounds, Total	lbs/day	22	80
Ammonia Nitrogen, Total (as N)	lbs/day	2,200	4,800
Sulfide, Total	lbs/day	32	71
Chromium, Total Recoverable	lbs/day	25	73
Chromium (VI), Total Recoverable	lbs/day	2.1	4.6
pH	s.u.	6.0 – 9.0[1]	

[1] If the Discharger employs continuous pH monitoring (with exception to necessary calibration and maintenance checks), it shall be in compliance with the pH limitation specified herein, provided that both of the following conditions are satisfied: (a) the total time during which pH values are outside the required range shall not exceed 7 hours and 26 minutes in any calendar month, and (b) no individual excursion from the required range of pH values shall exceed 60 minutes.

b. Additional effluent limitation allocations for contaminated runoff commingled with process wastewater are established in addition to the process wastewater mass-based limitations in section IV.A.1.a. When contaminated runoff is discharged through Discharge Point No. 001, a mass of each pollutant in Table 6b below may be added to the limitation for that pollutant in Table 6a. The additional allocation shall be equal to the contaminated runoff flow times the pollutant's concentration in Table 6b.

Table 6b. Additional Contaminated Runoff Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
BOD	mg/L	26	48
TSS	mg/L	21	33
COD	mg/L	180	360
Oil and Grease	mg/L	8	15
Phenolic Compounds, Total	mg/L	0.17	0.35
Chromium, Total Recoverable	mg/L	0.21	0.60
Chromium (VI) Total Recoverable	mg/L	0.028	0.062

c. Additional effluent limitation allocations for ballast water are established in addition to the process wastewater mass-based limitations in section IV.A.1.a. When ballast water is discharged through Discharge Point No. 001, a mass of each pollutant in Table 6c below may be added to the limitation for that pollutant in Table 6a. The additional allocation shall be equal to the ballast water flow times the pollutant's concentration in Table 6c.

Table 6c. Additional Ballast Water Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
BOD	mg/L	26	48
TSS	mg/L	21	33

Parameter	Units	Average Monthly	Maximum Daily
COD	mg/L	240	470
Oil and Grease	mg/L	8	15

2. Effluent Limitations for Toxics Substances

a. The Discharger shall comply with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001, as described in the attached MRP (Attachment E):

Table 7. Effluent Limitations for Toxic Substances at Discharge Point No. 001

Parameter	Units	Final Effluent Limitations[1]	
		Average Monthly	Maximum Daily
Cyanide, Total	µg/L	19	45
Copper, Total Recoverable	µg/L	84	120
Lead, Total Recoverable	µg/L	7.0	16
Selenium, Total Recoverable	µg/L	33	34
Dioxin-TEQ	µg/L	1.4×10^{-8}	2.8×10^{-8}
Ammonia Nitrogen, Total (as N)	mg/L	51	150

[1] a. Limitations apply to the average concentration of all samples collected during the averaging period (daily = 24-hour period; monthly = calendar month).

b. All metals limitations are expressed as total recoverable metal.

3. Mass Emission Limitation for Selenium

a. Until implementation of a total maximum daily load (TMDL) is in effect for selenium, the Discharger shall not increase mass loading of selenium to San Pablo Bay through Discharge Point No. 001, with compliance measured at Monitoring Location E-001, as described in the attached MRP (Attachment E).

Selenium mass emissions shall not exceed 0.82 kilograms per day (kg/d) as a running annual average.

The running annual average is the arithmetic average of the current day's mass loads for each of the previous 364 days, as shown in the following example:

$$\text{Annual Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

where:
N = number of samples analyzed in any calendar year
Q_i = flow rate (MGD) associated with the Ith sample
C_i = selenium concentration (mg/L) associated with the Ith sample.

4. Acute Toxicity

a. The Discharger shall comply with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001. Acute bioassays shall be conducted in compliance with MRP section V.A (Attachment E).

The survival of organisms in undiluted effluent shall be:

i. an eleven (11) sample median value of not less than 90 percent survival, and

ii. an eleven (11) sample 90 percentile value of not less than 70 percent survival.

b. These acute toxicity limitations are further defined as follows:

11 sample median: A bioassay test showing survival of less than 90 percent represents a violation of this effluent limitation, if five or more of the past ten or fewer bioassay tests also show less than 90 percent survival.

90th percentile: A bioassay test showing survival of less than 70 percent represents a violation of this effluent limitation, if one or more of the past ten or fewer bioassay tests show less than 70 percent survival.

c. Bioassays shall be performed using the most up-to-date USEPA protocol and the most sensitive species as specified in the MRP. Bioassays shall be conducted in compliance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms,* currently 5th Edition (EPA-821-R-02-012).

d. If the Discharger can demonstrate to the satisfaction of the Executive Officer that toxicity exceeding the levels cited above is caused by ammonia and that the ammonia in the discharge complies with the ammonia effluent limitations, then such toxicity does not constitute a violation of this effluent limitation.

5. Chronic Toxicity

a. The Discharger shall comply with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001. Chronic bioassays shall be conducted in compliance with MRP section V.B (Attachment E).

The survival of bioassay test organisms in the discharge at Discharge Point No. 001 shall be:

i. A three sample median value equal to or less than 10 TUc, and

ii. A single sample value equal to or less than 20 TUc.

b. These chronic toxicity limits are defined as follows:

i. A test sample showing chronic toxicity greater than 10 TUc is a violation of this limitation if one or more of the past two or fewer tests show toxicity greater than 10 TUc.

ii. A TUc equals 100/NOEL. The No Observable Effect Level (NOEL) shall equal to the IC_{25} or EC_{25} (see Attachment E, Appendix E-1). If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall equal the No Observable Effect Concentration (NOEC) derived using hypothesis testing. The NOEC is the maximum percent effluent concentration that causes no observable effect on test organisms, based on a critical life stage toxicity test. The NOEL shall be based on a critical life stage test using the most sensitive test species as specified in MRP section V.B (Attachment E). If two compliance test species are specified, compliance shall be based on the maximum TUc value of the discharge samples based on a comparison of TUc values obtained through concurrent testing of the two species.

iii. A test sample showing chronic toxicity greater than 20 TUc represents a violation of this limitation.

c. Test Species and Methods

The Discharger shall conduct routine monitoring with the test species and protocols specified in MRP section V.B (Attachment E). The Discharger shall also perform Chronic Toxicity Screening Phase monitoring as described in the MRP Appendix E-1 (Attachment E). Chronic Toxicity Monitoring Screening Phase Requirements, Critical Life Stage Toxicity Tests and definitions of terms used in the chronic toxicity monitoring are identified in MRP Appendices E-1 and E-2 (Attachment E).

6. Effluent Limitation Adjustments for Recycled Water Use

When the Discharger uses recycled water, adjustments for influent concentrations for constituents in this Order with mass or concentration based effluent limitations shall be granted in the discharge according to the following procedure:

a. The Discharger shall sample and analyze for constituents for which effluent limitation adjustment is sought at least as frequently as is required in the attached Monitoring and Reporting Program (MRP) for that constituent. Influent sampling shall occur at influent sampling station I-001 defined in the MRP.

b. The Discharger shall determine the time interval between introduction of a given constituent of concern in the influent recycled water and the first appearance of the constituent in the final effluent. This determination is subject to approval by the Executive Officer, and must precede any calculation of effluent limitation adjustment for the constituent.

c. Adjustment for copper, lead, selenium, and cyanide will be given as follows:

Concentration Adjustment
Influent concentration multiplied by total influent reclaimed water flow volume for that monitoring interval will yield an influent mass for each constituent, which is valid for that monitoring interval. After the appropriate time lag interval described in IV.A.6.b above, this influent mass of the constituent is then divided by the total effluent flow volume for that monitoring period to give a concentration adjustment for the effluent that will apply for the monitoring interval. The monitoring interval is the time between sampling days. For example, weekly sampling yields a one week monitoring interval. A schematic example follows:

ex. Constituent B is monitored weekly. The lag time is Y days.

Step 1: (Influent concentration of recycled water B- influent concentration of potable water B) x (Total Influent Volume of Reclaimed Water for one week) = (Influent mass of B)

Step 2: (Influent mass of B) / (Discharge Point No. 001 discharge volume for one week, Y days after influent week) = (Concentration adjustment to be subtracted from concentration of constituent in the effluent, valid for that one week period)

The potable water concentrations used in Step 1 can be an average of samples (minimum of one sample) collected over the last year.

d. The application of recycled water adjustments shall not result in effluent limitations greater than the following:

Table 8. Maximum Recycled Water Adjustments

Parameter	Units	Maximum Recycled Water Adjusted Effluent Limitations	
		Average Monthly	Maximum Daily
Cyanide	µg/L	38	90
Copper	µg/L	170	240
Lead	µg/L	13	30
Selenium	µg/L	82	130

e. Adjustment for selenium and technology-based limits listed in Table 6a will be given as follows:

Mass Adjustment
Influent concentration multiplied by total influent reclaimed water volume for that monitoring interval will yield an influent mass for each constituent, which is valid for that monitoring interval. After the appropriate time lag interval described in IV.A.6.b above, this influent mass of the constituent is then divided by the number of days in that monitoring period to give a mass adjustment for the effluent that will apply for the

monitoring interval. The monitoring interval is the time between sampling days. For example, weekly sampling yields a one week monitoring interval. A schematic example follows:

ex. Constituent B is monitored weekly. The lag time is Y days.

Step 1: (Influent concentration of reclaimed water B – influent concentration of potable water B) x (Total Influent Volume of Reclaimed Water for one week) = (Influent mass of B)

Step 2: (Influent mass of B) / (The Number of Days in that monitoring interval) = (Mass adjustment to be subtracted from mass of constituent in the effluent, valid for that one week period)

B. Stormwater Effluent Limitations - Discharge Point Nos. 002 – 023

1. Stormwater discharged at Discharge Point Nos. 002 -023 shall not exceed the effluent limitations in the table below.

Table 9. Effluent Limitations for Stormwater Outfalls

Parameter	Units	Effluent Limitations			
		Average Monthly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
TOC	mg/L	--	110	--	--
Oil and Grease	mg/L	--	15	--	--
pH	s.u.	--	--	6.5	8.5
Visible Oil	--	None observed			
Visible Color	--	None observed			

2. If there is an exceedance of either limitation for TOC or Oil and Grease expressed in Table 9, above, the effluent limitations in Table 10, below, shall become effective for the discharge point where the exceedance occurred and remain in effect until such time the Discharger can demonstrate to the satisfaction of the Executive Officer that the stormwater is not contaminated.

Table 10. Supplemental Effluent Limitations for Stormwater Outfalls

Pollutant	Units	Daily Maximum	30-Day Average[1]
BOD_5	mg/L	48	26
TSS	mg/L	33	21
COD	mg/L	360	180
Oil and Grease	mg/L	15	8.0
Phenolic Compounds	mg/L	0.35	0.17
Total Chromium	mg/L	0.60	0.21
Hexavalent Chromium	mg/L	0.062	0.028

[1] Compliance with the 30-day average limitation shall be determined as a rolling 30-day average. The rolling 30-day average shall be calculated as the arithmetic average of the concentrations detected over the current day and previous 29 days. This limitation shall not apply unless there is sufficient runoff for sampling on at least three out of 30 consecutive days.

V. RECEIVING WATER LIMITATIONS

A. Receiving water limitations are based on water quality objectives in the Basin Plan and are a required part of this Order. The discharges shall not cause the following in waters of the State at any place:

1. Floating, suspended, or deposited macroscopic particulate matter or foams;

2. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

3. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

4. Visible, floating, suspended, or deposited oil and other products of petroleum origin.

5. Toxic or other deleterious substances to be present in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration; and,

B. The discharge of waste shall not cause the following limits to be exceeded in waters of the State within one foot of the water surface:

1.	Dissolved Oxygen	5.0 mg/L, minimum The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.
2.	Dissolved Sulfide	Natural background levels
3.	pH	6.5 (minimum) to 8.5 (maximum)
4.	Nutrients	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

C. The discharge shall not cause a violation of any water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the CWA and regulations adopted thereunder. If more stringent applicable water quality standards are

promulgated or approved, the Regional Water Board may revise and modify this Order in accordance with them.

VI. PROVISIONS

A. Standard Provisions

1. Federal Standard Provisions

The Discharger shall comply with Federal Standard Provisions included in Attachment D of this Order.

2. Regional Standard Provisions

The Discharger shall comply with all applicable items of the Regional Standard Provisions and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits (Attachment G), including amendments thereto.

B. MRP Requirements

The Discharger shall comply with the MRP (Attachment E) and future revisions thereto, including applicable sampling and reporting requirements in the two standard provisions listed in section VI.A, above.

C. Special Provisions

1. Reopener Provisions

The Regional Water Board may modify or reopen this Order (in accordance with federal regulations) prior to its expiration date in any of the following circumstances as allowed by law:

a. If present or future investigations demonstrate that the discharge governed by this Order will have, or will cease to have, a Reasonable Potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters.

b. If new or revised water quality objectives (WQOs) or TMDLs come into effect for the San Francisco Bay estuary and contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order will be modified as necessary to reflect updated WQOs and wasteload allocations in TMDLs. Adoption of effluent limitations in this Order is not intended to restrict in any way future modifications based on legally adopted WQOs or TMDLs, or as otherwise permitted under federal regulations governing NPDES permit modifications.

c. If translator or other water quality studies provide a basis for determining that a permit condition should be modified.

d. If an administrative or judicial decision on a separate NPDES permit or WDR addresses requirements similar to this discharge.

e. Or as otherwise authorized by law.

The Discharger may request a permit modification based on the above. The Discharger shall include in any such request an antidegradation and anti-backsliding analysis.

2. Effluent Characterization Study and Report - Discharge Points 001, 003, 008, 009, 018, and 019

a. Study Elements

The Discharger shall continue to characterize and evaluate discharges from the following discharge points to verify that the "no" or "cannot determine" reasonable potential analysis conclusions of this Order remain valid and to inform the next permit reissuance. The Discharger shall collect representative samples of the discharge at the following monitoring stations, as defined in the MRP (Attachment E), at no less than the frequencies specified below:

Discharge Point	Monitoring Station	Frequency
001	E-001	2/year
003	E-003	2/5 years[1]
008	E-008	2/5 years[1]
009	E-009	2/5 years[1]
018	E-018	2/5 years[1]
019	E-019	2/5 years[1]

[1] Monitoring is contingent upon the discharge of stormwater at this discharge point. If no discharge occurs, monitoring is not required.

The samples shall be analyzed for the priority pollutants listed in Table C of the Regional Standard Provisions (Attachment G), except for those priority pollutants with effluent limitations where the MRP already requires monitoring. Compliance with this requirement shall be achieved in accordance with the specifications of Regional Standard Provisions (Attachment G) sections III.A.1 and III.A.2.

The Discharger shall evaluate on an annual basis if concentrations of any priority pollutant increase over past performance. The Discharger shall investigate the cause of any increase. The investigation may include, but need not be limited to, an increase in monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. This requirement may be satisfied through identification of the constituent as a "pollutant of concern" in the Discharger's Pollutant Minimization Program, described in Provision VI.C.3.

b. Reporting Requirements

i. Routine Reporting

The Discharger shall, within 30 days of receipt of analytical results, report in the transmittal letter for the appropriate monthly self-monitoring report the following:

a. Indication that a sample or samples for this characterization study was or were collected; and

b. Identity of any and all priority pollutants detected above or within one order of magnitude of their applicable water quality criteria (see Fact Sheet [Attachment F] Table F-19 for the criteria), together with the detected concentrations of those pollutants.

ii. Annual Reporting

The Discharger shall provide a summary of the annual data evaluation and source investigation in the annual self-monitoring report.

iii. Final Report

The Discharger shall submit a final report that presents all these data to the Regional Water Board no later than 180 days prior to the Order expiration date. The final report shall be submitted with the application for permit reissuance.

c. Ambient Background Receiving Water Study

The Discharger shall collect, or participate in collecting, ambient background receiving water priority pollutant monitoring data necessary to perform reasonable potential analyses and to calculate effluent limitations. The data on the conventional water quality parameters (pH, salinity, and hardness) shall also be sufficient to characterize these parameters in the receiving waters at a point after the discharge has mixed with the receiving waters. This provision may be met through the Collaborative Bay Area Clean Water Agencies Study or a similar ambient monitoring program for San Francisco Bay. This Order may be reopened, as appropriate, to incorporate effluent limitations or other requirements based on these data.

d. Effluent and Receiving Water Selenium Characterization Study

The Discharger shall comply with the following tasks and schedule set forth in Table 11. The Discharger may complete, or cause to be completed, all or some of the required tasks collaboratively. All submittals shall be acceptable to the Executive Officer. Upon request by the Discharger, the Executive Officer may modify the deadlines for the following tasks by no more than three years if good cause exists, such as delays in data collection, sample collection, analytical turnaround, or receipt of third party reports; laboratory QA/QC problems; other factors outside the Discharger's control; or new information that warrants schedule modification. Good cause does not include delays caused by the Discharger, or that could have been reasonably avoided. Any requests for schedule modification shall be in writing with necessary justification. Any approval shall also be in writing.

Table 11. Receiving Waters and Effluent Selenium Characterization Study Tasks and Schedule

Tasks	Compliance Date
1. Submit a study plan for a minimum two-year study that includes the following elements: (a) effluent and receiving water sampling locations (the effluent sampling location may be the existing effluent compliance sampling point; receiving water sampling locations shall be within a 100-foot radius of the outfall to characterize near-field concentrations and speciation); (b) receiving water sampling along transects from the Pacific Ocean (Golden Gate) to the Sacramento River (Rio Vista) and San Joaquin River (USGS Station 757), including sampling in the freshwater portions of the rivers at Vernalis (San Joaquin River) and Freeport (Sacramento River); (c) sampling and analysis protocols (including means to evaluate seasonal conditions under low and high flows from the Sacramento / San Joaquin River Delta, selenium concentrations in the water column and suspended particles, and speciation and particulate selenium content in the effluent); (d) comparison of the proposed protocols and analytical methods to previous sampling efforts; (e) sampling parameters (including, at a minimum, salinity, carbon, nitrogen, and chlorophyll-a in receiving water, and dissolved and particulate selenate, selenite, organic selenides, and elemental selenium concentrations in both effluent and receiving water); (f) data interpretation models and other methods to be used (representing conservative, reasonable worst case conditions); and (g) implementation schedule.	Completed
2. Begin implementation of the study plan developed for Task (1).	Completed
3. Submit a status report for Tasks 1 and 2 containing, at a minimum, monitoring data collected since the beginning of the study, summary of results to date, and necessary updates to the study plan.	February 1, 2012, with annual self-monitoring report
4. Submit a final study report that includes the following elements: (a) sampling results, data interpretation, and conclusions, such as receiving water and mixing zone characterization, seasonal variability, etc.; (b) effluent characterization; (c) determination if there is reasonable potential for selenium in the discharge to violate the Basin Plan's narrative bioaccumulation objective through the use of pertinent models; (d) comparison of near-field selenium water column concentrations to applicable numeric objectives; (e) demonstration of spatial and temporal extent to which the objectives and other relevant guidelines are being exceeded; and (f) determination of whether selenium levels adversely affect food web or wildlife, or contribute to bioaccumulation.	August 15, 2012

e. The Discharger shall perform a dilution modeling study for the deep-water diffuser at Discharge Point 001 and report the results no later than 180 days prior to the expiration date of this Order (the Discharger may report the results with its application for permit reissuance). The study shall use a USEPA-approved modeling program such as Visual

PLUMES or CORMIX and estimate the initial dilution at Discharge Point 001 at slack tide for both the maximum wet-weather discharge and the average daily discharge.

3. Best Management Practices and Pollution Minimization

a. The Discharger shall continue to improve, in a manner acceptable to the Executive Officer, its Pollution Minimization Program to promote minimization of pollutant loadings to the treatment plant and therefore to the receiving waters.

b. The Discharger shall submit an annual report, acceptable to the Executive Officer, no later than February 28 of each year. Each annual report shall include at least the following information:

i. *A brief description of the treatment plant and treatment plant processes.*

ii. *A discussion of the current pollutants of concern.* Periodically, the Discharger shall determine which pollutants are currently a problem and which pollutants may be potential future problems. This discussion shall include the reasons for choosing the pollutants.

iii. *Identification of sources of pollutants of concern.* This discussion shall address how the Discharger intends to estimate and identify sources of pollutants of concern. The Discharger shall also identify sources or potential sources not directly within its ability or authority to control, such as pollutants in the potable water supply and air deposition.

iv. *Identification of tasks to reduce the sources of pollutants of concern.* This discussion shall identify and prioritize tasks to address the Discharger's pollutants of concern. The Discharger may implement tasks themselves or participate in group, regional, or national tasks that will address its pollutants of concern. The Discharger is strongly encouraged to participate in group, regional, or national actions that will address its pollutants of concern whenever it is efficient and appropriate to do so. A time line shall be included for the implementation of each task.

v. *Outreach to employees.* The Discharger shall inform its employees regarding pollutants of concern, potential sources, and how they might be able to help reduce discharge of these pollutants into the treatment facilities. The Discharger may provide a forum for employees to provide input.

vi. *Discussion of criteria used to measure Pollutant Minimization Program and task effectiveness.* The Discharger shall establish criteria to evaluate the effectiveness of its Pollutant Minimization Program. The section shall discuss the specific criteria used to measure the effectiveness of each task in sections VI.C.3.b.iv and v.

vii. *Documentation of efforts and progress.* This discussion shall detail all of the Discharger's activities in the Pollutant Minimization Program during the reporting year.

viii. *Evaluation of Pollutant Minimization Program and task effectiveness.* The Discharger shall use the criteria established in section VI.C.3.b.vi to evaluate the Program's and tasks' effectiveness.

ix. *Identification of specific tasks and time schedules for future efforts.* Based on the evaluation, the Discharger shall describe how it will continue or change its Pollutant Minimization Program tasks to more effectively reduce the loading of pollutants to the treatment plant and subsequently in its effluent.

c. Pollutant Minimization Program for Pollutants with Effluent Limitations

The Discharger shall develop and conduct a Pollutant Minimization Program as further described below when there is evidence that a priority pollutant is present in the effluent above an effluent limitation (e.g., sample results reported as "detected but not quantified" (DNQ) when the effluent limitation is less than the method detection limit (MDL), sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) and either:

i. A sample result is reported as DNQ and the effluent limitation is less than the reporting level (RL); or

ii. A sample result is reported as not detected (ND) and the effluent limitation is less than the MDL, using SIP definitions.

d. Pollutant Minimization Program Submittals for Pollutants with Effluent Limitations

If triggered by the reasons in section VI.C.3.c., above, the Discharger's Pollutant Minimization Program shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

i. Annual review and semi-annual monitoring of potential sources of the reportable priority pollutants, which may include fish tissue monitoring and other bio-uptake sampling, or alternative measures approved by the Executive Officer when it is demonstrated that source monitoring is unlikely to produce useful analytical data;

ii. Quarterly monitoring for the reportable priority pollutants in the influent to the wastewater treatment system, or an alternative measure approved by the Executive Officer when it is demonstrated that influent monitoring is unlikely to produce useful analytical data;

iii. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable priority pollutants in the effluent at or below the effluent limitations;

iv. Implementation of appropriate cost-effective control measures for the reportable priority pollutants, consistent with the control strategy; and

v. The annual report required by section VI.C.3.b above shall specifically address the following items:

(a) All Pollutant Minimization Program monitoring results for the previous year;

(b) List of potential sources of the reportable priority pollutants;

(c) A summary of all actions undertaken pursuant to the control strategy; and

(d) A description of actions to be taken in the following year.

4. Other Special Provisions

a. Cyanide Action Plan

The Discharger shall implement monitoring and surveillance, pretreatment, source control, and pollution prevention for cyanide in accordance with the following tasks and time schedule.

Table 12. Cyanide Action Plan

Task	Compliance Date
1. Review Potential Cyanide Contributors The Discharger shall submit an inventory of potential sources of cyanide to Discharge 001.	Completed
2. Implement Cyanide Control Program The Discharger shall submit a plan for and begin implementation of a program to minimize cyanide discharges. The plan shall include the following elements at a minimum: a. Inspect each potential contributor to assess the need to include that contributing source in the control program. b. Prepare an emergency response and monitoring plan to be implemented if a significant cyanide discharge occurs. c. If ambient monitoring shows cyanide concentrations of 1.0 µg/L or higher in the main body of San Francisco Bay, undertake actions to identify and abate cyanide sources responsible for the elevated ambient concentrations.	With annual PMP report due February 28, 2012
3. Implement Additional Cyanide Control Measures If the Regional Water Board notifies the Discharger that ambient monitoring shows cyanide concentrations of 1.0 µg/L or higher in the main body of San Francisco Bay, the Discharger shall commence actions to identify and abate cyanide sources responsible for the elevated ambient concentrations.	Begin implementation within 90-days of notification
4. Report Status of Cyanide Control Program Submit a report to the Regional Water Board documenting implementation of the cyanide control program.	Annually with annual PMP reports due February 28

b. Copper Action Plan

The Discharger shall implement pretreatment, source control, and pollution prevention for copper in accordance with the following tasks and time schedule.

Table 13. Copper Action Plan

Task	Compliance Date
1. Review Potential Copper Sources The Discharger shall submit an inventory of potential copper sources to the treatment plant	With annual pollution prevention report due on February 28, 2012
2. Implement Copper Control Program The Discharger shall submit a plan for and begin implementation of a program to reduce copper discharges identified in Task 1.	July 1, 2012
3. Implement Additional Measures If the Regional Water Board notifies the Discharger that the three-year rolling mean dissolved copper concentration of the receiving water exceeds 3.0 µg/L, the Discharger shall evaluate the effluent copper concentration trend, and if it is increasing, develop and begin implementation of additional measures to control copper discharges.	Begin implementation of additional measures within 90 days of the notification
4. Submit Studies to Reduce Copper Pollutant Impact Uncertainties The Discharger shall submit an updated study plan and schedule to conduct, or cause to be conducted, technical studies to investigate possible copper sediment toxicity and technical studies to investigate sublethal effects on salmonids. Specifically, the Discharger shall include the manner in which the above will be accomplished and describe the studies to be performed with an implementation schedule. To satisfy this requirement, dischargers may collaborate and conduct these studies as a group.	Completed
5. Report Status of Copper Control Program The Discharger shall submit a report documenting copper control program implementation and addressing the effectiveness of the actions taken, including any additional copper controls required by Task 3, above, together with a schedule for actions to be taken in the next 12 months. Additionally, the Discharger shall report the findings and results of the studies completed, planned, or in progress under Task 4. Regarding the Task 4 studies, dischargers may collaborate and provide this information in a single report to satisfy this requirement for an entire group.	Annually with annual pollution prevention reports due February 28

c. Stormwater Pollution Prevention Plan and Annual Report

The Discharger shall submit an updated Stormwater Pollution Prevention Plan (SWPPP) acceptable to the Executive Officer by October 1 of each year. If the Discharger determines that it does not need to update the SWPPP, it shall submit a letter indicating that no revision is necessary and stating the last year it updated the SWPPP. The SWPPP shall comply with the requirements in the Federal Standard Provisions (Attachment D).

The Discharger shall submit an annual stormwater report acceptable to the Executive Officer by July 1 of each year covering data for the previous wet weather season for the

identified stormwater discharge points. The annual stormwater report shall include, at minimum:

i. a tabulated summary of all sampling results and a summary of visual observations taken during inspections;

ii. a comprehensive discussion of the compliance record and any corrective actions taken or planned to ensure compliance with WDRs; and

iii. a comprehensive discussion of source identification and control programs for total suspended solids.

d. Wastewater Discharges from the Wetland

The Discharger may discharge Wetland effluent directly to Discharge Point No. 001 (downstream of the GAC facility) provided Wetland effluent discharges do not exceed a daily maximum of 3 MGD, and Wetland effluent does not cause acute toxicity. To document that Wetland effluent does not cause acute toxicity, the Discharger must show that two consecutive weekly flow-through bioassays demonstrate at least 80% survival. Acute toxicity testing on Wetland effluent shall conform to the requirements in this Order for Discharge Point No. 001 (e.g., test species shall be rainbow trout). Should Wetland toxicity tests show less than 80% survival, the Discharger must route Wetland effluent through its GAC facility before discharging to Discharge Point No. 001. The Discharger may resume discharging Wetland effluent directly to Discharge Point No. 001 after two consecutive Wetland toxicity tests, started at least five days apart, demonstrate at least 80% survival. In case the Discharger decides to route Wetland effluent directly to Discharge Point No. 001, it shall report the daily flow rate of this treated wastewater, and the results of acute toxicity testing.

e. Construction and Development Requirements for Stormwater

These requirements apply to development and construction activities that occur in areas where stormwater is not subject to physical treatment. These requirements do not apply to stormwater that drains to Chevron's wastewater treatment plant or stormwater that is treated in earthen basins via physical settling.

In areas where stormwater is not subject to physical treatment, the Discharger shall obtain coverage under *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* Order No. 2009-0009-DWQ.

For potential development in areas within Chevron's refinery that discharge to Discharge Point 020 (City of Richmond's Pump Station), the Discharger must also comply with the City of Richmond's specifications and planning authority so that the City is in compliance with the requirements contained in Provisions C.3 and C.6 of Municipal Regional Storm Water Permit Order No. R2-2009-0074, NPDES No. CAS612008.

VII. COMPLIANCE DETERMINATION

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in Attachment A—Definitions, the MRP (Attachment E), Fact Sheet section VI, and the Regional Standard Provisions (Attachment G). For purposes of reporting and administrative enforcement by the Regional and State Water Boards, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the RL.

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ), also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

> Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL): the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL): the highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative pollutants are those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (*CV*) is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge: Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in this Order), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA) is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as wasteload allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration is the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include, but are not limited to, the Sacramento-San Joaquin Delta, as defined in California Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters are all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation: the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation: the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL) means the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median is the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND) are those sample results less than the laboratory's MDL.

Ocean Waters are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program (PMP) means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to California Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in California Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Regional Water Board.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from SIP Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based

analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Satellite Collection System is the portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Source of Drinking Water is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

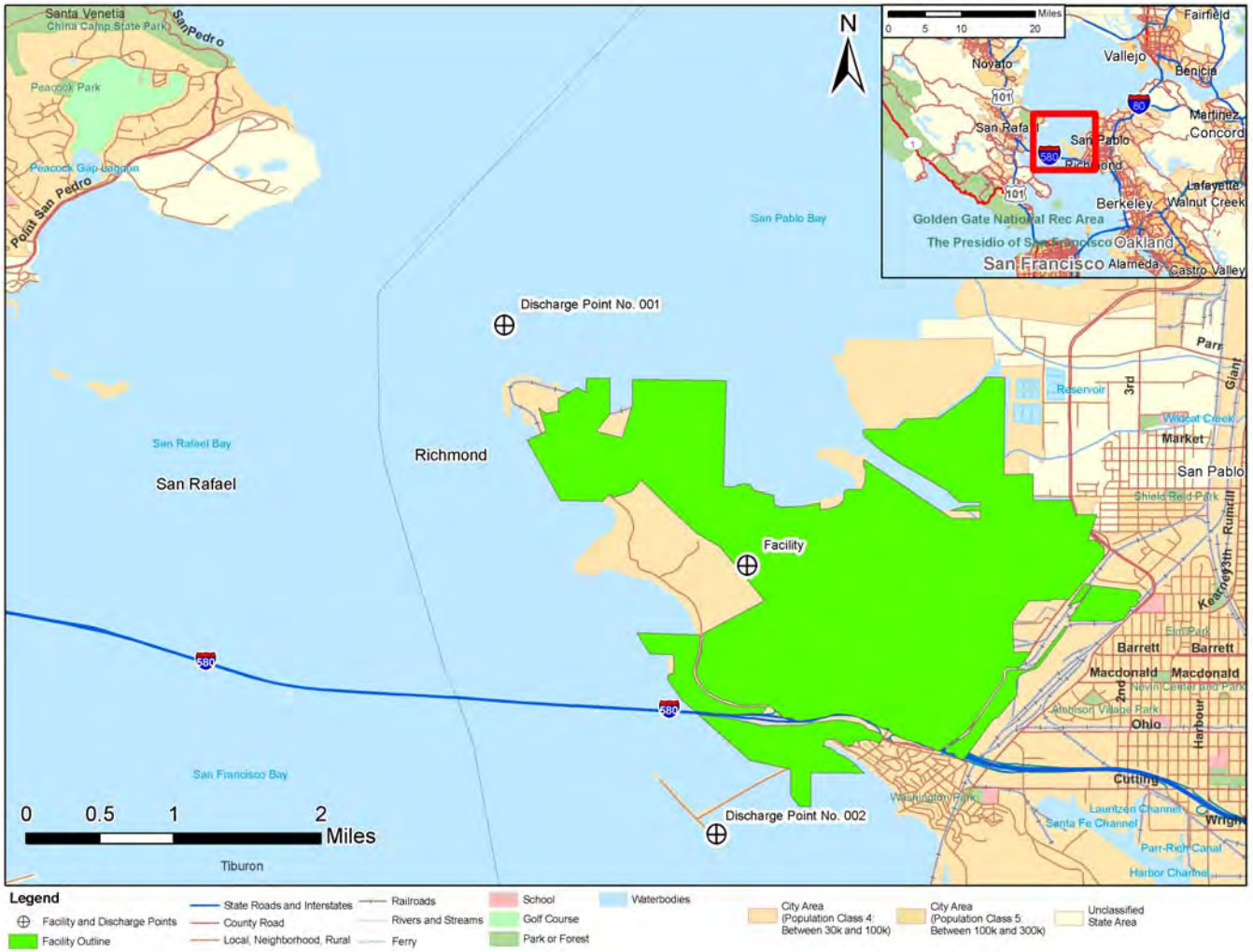
Standard Deviation (σ) is a measure of variability that is calculated as follows:

$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

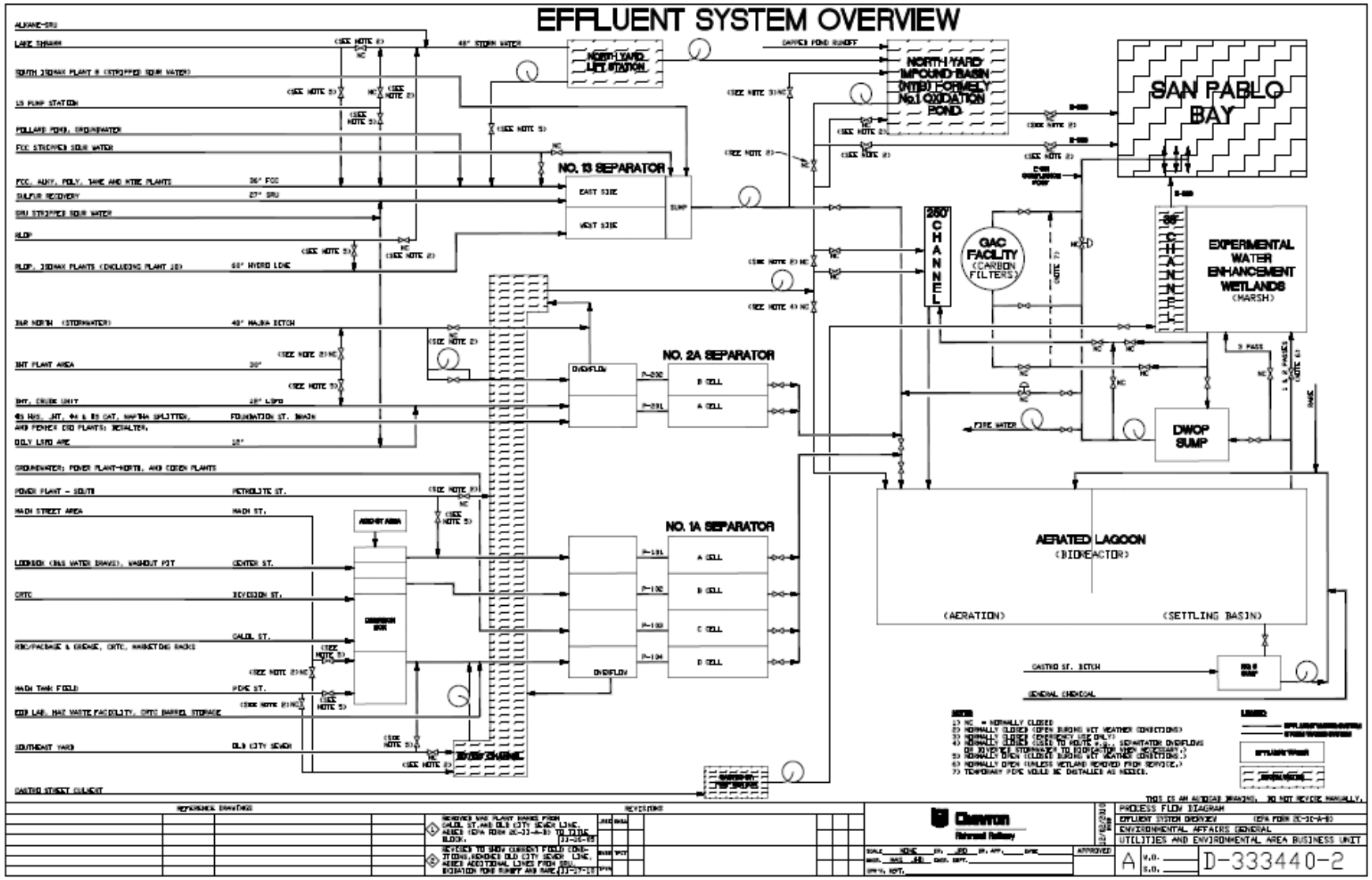
where:
x is the observed value;
μ is the arithmetic mean of the observed values; and
n is the number of samples.

Toxicity Reduction Evaluation (TRE) is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

ATTACHMENT B – MAP



ATTACHMENT C – PROCESS FLOW DIAGRAM



ATTACHMENT D – FEDERAL STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 CFR § 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 CFR § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 CFR § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order (40 CFR § 122.41(e)).

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR § 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations. (40 CFR § 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (USEPA), or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 CFR § 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 CFR § 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 CFR § 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 CFR § 122.41(i)(3)); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (40 CFR § 122.41(i)(4).)

G. Bypass

1. Definitions

a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR § 122.41(m)(1)(i).)

b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR § 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 CFR § 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 CFR § 122.41(m)(4)(i)):

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR § 122.41(m)(4)(i)(A));

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent

a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR § 122.41(m)(4)(i)(B)); and

c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 CFR § 122.41(m)(4)(i)(C).)

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 CFR § 122.41(m)(4)(ii).)

5. Notice

a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 CFR § 122.41(m)(3)(i).)

b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 CFR § 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 CFR § 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR § 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR § 122.41(n)(3)):

a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR § 122.41(n)(3)(i));

b. The permitted facility was, at the time, being properly operated (40 CFR § 122.41(n)(3)(ii));

c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 CFR § 122.41(n)(3)(iii)); and

d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 CFR § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 CFR § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 CFR § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of this Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 CFR § 122.41(l)(3); § 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR § 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503 unless other test procedures have been specified in this Order. (40 CFR § 122.41(j)(4); § 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 CFR § 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 CFR § 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 CFR § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 CFR § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 CFR § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 CFR § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR § 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 CFR § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR § 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 CFR § 122.41(k))

2. All permit applications shall be signed by a responsible corporate officer. For purposes of this provision, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 CFR § 122.22(a)(1))

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR § 122.22(b)(1));

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR § 122.22(b)(2)); and

c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 CFR § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 CFR § 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 CFR § 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 CFR § 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board. (40 CFR § 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 CFR § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 CFR § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR § 122.41(l)(6)(ii)):

a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 CFR § 122.41(l)(6)(ii)(A).)

b. Any upset that exceeds any effluent limitation in this Order. (40 CFR § 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 CFR § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 CFR § 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 CFR § 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including

notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR§ 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 CFR § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 CFR § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR § 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this Order under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe (40 CFR § 122.42(a)):

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" (40 CFR § 122.42(a)(1)):

a. 100 micrograms per liter (µg/L) (40 CFR § 122.42(a)(1)(i));

b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 CFR § 122.42(a)(1)(ii));

c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 CFR § 122.42(a)(1)(iii)); or

d. The level established by the Regional Water Board in accordance with section 122.44(f). (40 CFR § 122.42(a)(1)(iv).)

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 CFR § 122.42(a)(2)):

a. 500 micrograms per liter (µg/L) (40 CFR § 122.42(a)(2)(i));

b. 1 milligram per liter (mg/L) for antimony (40 CFR § 122.42(a)(2)(ii));

c. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 CFR § 122.42(a)(2)(iii)); or

d. The level established by the Regional Water Board in accordance with section 122.44(f). (40 CFR § 122.42(a)(2)(iv).)

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

40 CFR 122.48 requires that all National Pollution Discharge Elimination System (NPDES) permits specify monitoring and reporting requirements. California Water Code (CWC) sections 13267 and 13383 also authorize the Regional Water Board to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements that implement federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. The Discharger shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 CFR 122.62, 122.63, and 124.5. If any discrepancies exist between the MRP and the Regional Standard Provisions, the MRP prevails.

B. The Discharger shall conduct all monitoring in accordance with Attachment D, section III, as supplemented by Attachment G of this Order. Equivalent test methods must be more sensitive than those specified in 40 CFR 136, must be specified in the permit, and must be approved for use by the Executive Officer, following consultation with the State Water Board Quality Assurance Program.

II. MONITORING LOCATIONS

The Discharger shall monitor at the following locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order.

Table E-1. Monitoring Station Locations

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Recycled Water	I-001	Located at any point in the pipe which delivers only recycled water to the facility, but upstream of any wastewater treatment unit, blending point, or point of use.
Treated Wastewater	E-001	At any point in the discharge line from the deep water discharge pump sump such that the sample is representative of treated wastewater.
Richmond Long Wharf (firewater)	E-002	At any point where a representative sample of stormwater and authorized non-stormwater discharges for the drainage area for Discharge Point No. 002 can be obtained prior to discharge.
Stormwater	E-003	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 003 can be obtained prior to discharge.
Stormwater	E-004	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 004 can be obtained prior to discharge.
Stormwater	E-005	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 005 can be obtained prior to discharge.
Stormwater	E-006	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 006 can be obtained prior to discharge.
Stormwater	E-007	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 007 can be obtained prior to discharge.

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Stormwater	E-008	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 008 can be obtained prior to discharge.
Stormwater	E-009	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 009 can be obtained prior to discharge.
Stormwater	E-010	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 010 can be obtained prior to discharge.
Stormwater	E-011	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 011 can be obtained prior to discharge.
Stormwater	E-012	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 012 can be obtained prior to discharge.
Stormwater	E-013	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 013 can be obtained prior to discharge.
Stormwater	E-014	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 014 can be obtained prior to discharge.
Stormwater	E-015	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 015 can be obtained prior to discharge.
Stormwater	E-016	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 016 can be obtained prior to discharge.
Stormwater	E-017	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 017 can be obtained prior to discharge.
Stormwater	E-018	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 018 can be obtained prior to discharge.
Stormwater	E-019	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 019 can be obtained prior to discharge.
Stormwater	E-020	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 020 can be obtained prior to discharge.
Stormwater	E-021	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 021 can be obtained prior to discharge.
Stormwater	E-022	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 022 can be obtained prior to discharge.
Stormwater	E-023	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 023 can be obtained prior to discharge.
Receiving Water	C-001	At any point that is representative of salinity and hardness near Discharge Point 001. The Discharger may also satisfy this requirement by ensuring such samples are collected by the RMP.

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Rainfall	R-1	The nearest official National Weather Service rainfall station, the Discharger's Laboratory rain gauge, or other station acceptable to the Executive Officer.

III. INFLUENT MONITORING REQUIREMENTS

A. Monitoring Location I-001

1. Monitoring at I-001 is only required if the Discharger chooses to apply for recycled water adjustments, as allowed for by Section IV.A.6 Effluent Limitation Adjustment for Recycled Water Use.

Table E-2. Influent Monitoring at I-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Recycled Water Flow Rate [1]	MGD	Continuous	Continuous	[2]
Cyanide, Total	µg/L	Grab	1/Month	[2]
Copper, Total Recoverable	µg/L	Grab	1/Month	[2]
Lead, Total Recoverable	µg/L	Grab	1/Month	[2]
Selenium, Total Recoverable	µg/L	Grab	1/Week	[2]
Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C)	mg/L	Grab	1/Month	[2]
Total Suspended Solids (TSS)	mg/L	Grab	1/Month	[2]
Chemical Oxygen Demand (COD)	mg/L	Grab	1/Month	[2]
Oil and Grease	mg/L	Grab	1/Month	[2]
Phenolic Compounds, Total	mg/L	Grab	1/Month	[2]
Chromium, Total Recoverable	mg/L	Grab	1/Month	[2]
Chromium (VI), Total Recoverable	mg/L	Grab	1/Month	[2]
Sulfide, Total	mg/L	Grab	1/Month	[2]
Ammonia Nitrogen, Total (as N)	mg/L	Grab	1/Month	[2]

[1] For influent flows, the following information shall also be monitored and reported in the monthly SMRs:

a. Average Monthly Flow (million gallons per day, MGD)
b. Maximum Monthly Flow (MGD)
c. Minimum Monthly Flow (MGD)

[2] Pollutants and pollutant parameters shall be analyzed using the analytical methods described in 40 CFR 136.

IV. EFFLUENT MONITORING REQUIREMENTS

A. Monitoring Location E-001 (Discharge Point No. 001)

1. The Discharger shall monitor Discharge Point No. 001 (treated effluent) from Monitoring Location E-001 as follows:

Table E-3. Effluent Monitoring at E-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow Rate [1]	MGD	Continuous	Continuous	[2]
pH [3]	s.u.	Continuous	Continuous	[2]
Temperature	^{o}F	Continuous	Continuous	[2]
BOD	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
TSS	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
COD	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Oil and Grease	mg/L	Grab	1/Month	[2]
	lbs/day	Grab	1/Month	[2]
Phenolic Compounds, Total	mg/l	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Chromium, Total Recoverable[5]	µg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Chromium (VI), Total Recoverable	µg/L	Grab	1/Month	[2]
	lbs/day	Grab	1/Month	[2]
Sulfide, Total	mg/L	Grab	1/Month	[2],[6]
	lbs/day	Grab	1/Month	[2],[6]
Ammonia Nitrogen, Total (as N)	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Acute Toxicity	% Survival	C-24	1/Week	[7]
Chronic Toxicity	TU_c	C-24	1/Quarter	[8]
Copper, Total Recoverable	µg/L	C-24	1/Month	[2]
Lead, Total Recoverable	µg/L	C-24	1/Month	[2]
Selenium, Total Recoverable	µg/L	C-24	1/Week	[9]
	kg/day	C-24	1/Week	[9]
Cyanide, Total	µg/L	Grab	1/Month	[2]
2,3,7,8-TCDD and congeners	ρg/L	C-24	2/Year	[2]
Standard Observations	--	Daily	1/Day	--

[1] For effluent flows, the following information shall also be monitored and reported in the monthly SMRs:

a. Average Monthly Flow (million gallons per day, MGD)
b. Maximum Monthly Flow (MGD)
c. Minimum Monthly Flow (MGD)

[2] Pollutants and pollutant parameters shall be analyzed using the analytical methods described in 40 CFR 136.

[3] If pH is monitored continuously, the minimum and maximum pH values for the month shall be reported in monthly Self-Monitoring Reports (SMRs).

[4] Each oil and grease sample shall consist of a composite sample comprised of three grab samples taken at equal intervals during the sampling date, with each grab sample being collected in a glass container. Each glass container used for sample collection or mixing shall be thoroughly rinsed with solvent rinsing as soon as possible after use, and the solvent rinsing shall be added to the composite sample for extraction and analysis.

[5] The Discharger may, at its option, comply with the limits for hexavalent chromium by using total chromium results. In this case, analysis for hexavalent chromium is waived.

[6] Grab samples shall be collected coincident with composite samples collected for the analysis of regulated parameters.

[7] Acute Bioassay tests shall be performed in accordance with MRP section V.A.

[8] Critical Life Stage Toxicity Tests shall be performed and reported in accordance with the Chronic Toxicity Requirements specified in section V.B of this MRP.

[9] Selenium must be analyzed using methods described in USEPA Method No. 200.8, or Standard Method No. 3114B or 3114C.

B. Discharge Point Nos. 002 – 023

1. The Discharger shall monitor E-002, E-003, E-008 through E-010, E-012, E-014, and E-017 through E-023 as follows:

Table E-4. Schedule of Sampling, Analyses, and Observations for Stormwater

Parameter	Units	Sample Type	Minimum Sampling Frequency	Outfalls
Oil and Grease	mg/L	Grab[1]	At least 2/Year	All[2]
pH	s.u.	Grab[1]	At least 2/Year	All [2]
TOC	mg/L	Grab[1]	At least 2/Year	All [2]
TSS	mg/L	Grab[1]	At least 2/Year	All [2]
Specific Conductance	µmhos/cm	Grab[1]	At least 2/Year	All [2]
Standard Observations	--	Visual	At least 2/Year	All [2]
BOD_5	mg/L	Grab[1]	Daily during storm event	[2]
COD	mg/L	Grab[1]	Daily during storm event	[2]
Phenolic Compounds	mg/L	Grab[1]	Daily during storm event	[2]
Total Chromium	mg/L	Grab[1]	Daily during storm event	[2]
Hexavalent Chromium	mg/L	Grab[1]	Daily during storm event	[2]

[1] At least one grab sample shall be collected within the first 30 minutes of significant flow during a storm event.

[2] If and when the supplemental effluent limitations in Table 10 of this Order become effective in accordance with section IV.B.2 of this Order, the monitoring frequency at the outfalls where the limitations are in effect shall be increased to daily during each storm event.

[3] If and when limits for pollutants in Table 10 of this Order become effective in accordance with Section IV.B.2 of this Order, monitoring shall begin at the outfalls where the limitations are in effect.

[4] Sampling at least twice during the storm season for storm runoff discharges that do not drain to basins shall be during periods when the laboratory is normally staffed.

2. The Discharger shall monitor E-011 and E-013 as follows:

Table E-5. Schedule of Sampling, Analyses, and Observations for Stormwater

Parameter	Units	Sample Type	Minimum Sampling Frequency
Oil and Grease	mg/L	Grab	Each discharge event
pH	s.u.	Grab	Each discharge event
TOC	mg/L	Grab	Each discharge event
TSS	mg/L	Grab	Each discharge event
Specific Conductance	µmhos/cm	Grab	Each discharge event
Remaining Priority Pollutants[1]	µg/L	Grab	First discharge of wet season
Standard Observations	--	Visual	Each discharge event

[1] Priority pollutant sampling shall be conducted as specified in the Regional Standard Provisions (Attachment G). Priority pollutant sampling shall be done at least once, for each wet season, if there is a discharge.

3. The Discharger shall monitor E-004 through E-007 as follows:

Table E-6. Schedule of Sampling, Analyses, and Observations for Stormwater

Parameter	Units	Sample Type	Minimum Sampling Frequency
Oil and Grease	mg/L	Grab	1/5 Years
pH	s.u.	Grab	1/5 Years
TOC	mg/L	Grab	1/5 Years
TSS	mg/L	Grab	1/5 Years
Specific Conductance	µmhos/cm	Grab	1/5 Years
Standard Observations	--	Visual	1/5 Years

V. WHOLE EFFLUENT TOXICITY TESTING

The Discharger shall monitor acute and chronic toxicity at Monitoring Location E-001 as described below.

A. Whole Effluent Acute Toxicity

1. Compliance with the acute toxicity effluent limitations of this Order shall be evaluated by measuring survival of test organisms exposed to 96-hour continuous flow-through bioassays.

2. Test species shall be rainbow trout unless the Executive Officer specifies otherwise in writing.

3. All bioassays shall be performed according to the most up-to-date protocols in 40 CFR 136, currently in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition.

4. Monitoring of the bioassay water as specified by the *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition shall include, on a daily basis, the following parameters: pH, dissolved oxygen, ammonia (if toxicity is observed), temperature, hardness, and alkalinity. These results shall be reported. If the fish survival rate in effluent is less than 70 percent or if the control fish survival rate is

less than 90 percent, the bioassay test shall be restarted as soon as practical with new fish and shall continue back to back until compliance is demonstrated.

B. Whole Effluent Chronic Toxicity

1. Monitoring Requirements

a. *Sampling*. The Discharger shall collect 24-hour composite samples of the effluent at E-001 for critical life stage toxicity testing as indicated below. For toxicity tests requiring renewals, 24-hour composite samples collected on consecutive days are required.

b. *Test Species*. Chronic toxicity shall be monitored using critical life stage tests(s) and the most sensitive test species identified by screening phase testing. The approved test species is a water flea (*Ceriodaphnia dubia).*

c. *Methodology*. Sample collection, handling and preservation shall be in accordance with USEPA protocols. In addition, bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in Appendix E-1. These are *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, currently third edition (EPA-821-R-02-014), and *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, currently fourth Edition (EPA-821-R-02-013), with exceptions granted the Discharger by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP).

d. *Dilution Series.* The Discharger shall conduct tests at 100%, 50%, 25%, 10%, 5%, and 2.5%. The "%" represents percent effluent as discharged.

e. *Accelerated Monitoring*. The Discharger shall accelerate monitoring to occur monthly when either of the following conditions is exceeded:

i. Three sample median value of 10 chronic toxicity units (TUc), or

ii. Single sample maximum value of 20 TUc.

2. Reporting Requirements

a. *Routine Reporting*. Toxicity test results for the current reporting period shall include, at a minimum, for each test:

i. Sample dates

ii. Test initiation date

iii. Test species

iv. End point values for each dilution (e.g., number of young, growth rate, percent survival)

v. NOEC values in percent effluent

vi. IC_{15}, IC_{25}, IC_{40}, and IC_{50} values (or EC_{15}, EC_{25} ... etc.) as percent effluent

vii. TUc values (100/NOEC, 100/IC_{25}, or 100/EC_{25})

viii. Mean percent mortality (±s.d.) after 96 hours in 100% effluent (if applicable)

ix. NOEC and LOEC values for reference toxicant tests

x. IC50 or EC50 values for reference toxicant tests

xi. Available water quality measurements for each test (pH, dissolved oxygen, temperature, conductivity, hardness, salinity, ammonia)

b. *Compliance Summary*. The results of the chronic toxicity testing shall be provided in the self-monitoring report and shall include a summary table of chronic toxicity data from at least three of the most recent samples. The information in the table shall include items listed above under section V.B.2.a of this MRP, specifically item numbers i, ii, iii, vi (IC_{25} or EC_{25}), vii, and viii.

3. Toxicity Reduction Evaluation (TRE)

a. To be ready to respond to toxicity events, the Discharger shall prepare a generic TRE work plan by December 1, 2011. The Discharger shall review and update the work plan as necessary to remain current and applicable to the discharge and discharge facilities.

b. Within 30 days of exceeding either trigger for accelerated monitoring, the Discharger shall submit to the Regional Water Board a specific TRE work plan, which should be the generic work plan revised as appropriate for this toxicity event after consideration of available discharge data.

c. Within 30 days of the date of completion of the accelerated monitoring tests observed to exceed either trigger, the Discharger shall initiate a TRE in accordance with a TRE work plan that incorporates any and all comments from the Executive Officer.

d. The TRE shall be specific to the discharge and be prepared in accordance with current technical guidance and reference materials, including USEPA guidance materials. The TRE shall be conducted as a tiered evaluation process, as summarized below:

i. Tier 1 consists of basic data collection (routine and accelerated monitoring).

ii. Tier 2 consists of evaluation of optimization of the treatment process, including operation practices and in-plant process chemicals.

iii. Tier 3 consists of a toxicity identification evaluation (TIE).

iv. Tier 4 consists of evaluation of options for additional effluent treatment processes.

v. Tier 5 consists of evaluation of options for modifications of in-plant treatment processes.

vi. Tier 6 consists of implementation of selected toxicity control measures, and follow-up monitoring and confirmation of implementation success.

e. The TIE or TRE may be ended at any stage if monitoring finds there is no longer consistent toxicity (complying with requirements of section IV.A.5 of this Order).

f. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity. All reasonable efforts using currently available TIE methods shall be employed.

g. As toxic substances are identified or characterized, the Discharger shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the substances from the discharge. All reasonable steps shall be taken to reduce toxicity to levels consistent with chronic toxicity evaluation parameters.

h. Many recommended TRE elements parallel required or recommended efforts of source control, pollution prevention, and stormwater control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to comply with TRE requirements.

i. The Regional Water Board recognizes that chronic toxicity may be episodic and identification of causes of, and reduction of, sources of chronic toxicity may not be successful in all cases. Consideration of enforcement by the Regional Water Board will be based, in part, on the Discharger's actions and efforts to identify and control or reduce sources of consistent toxicity.

VI. RECEIVING WATER MONITORING REQUIREMENTS

The Discharger shall conduct receiving water monitoring at C-001 as summarized in the following table.

Table E-7. Receiving Water Monitoring at C-001

Parameter	Units	Sample Type	Minimum Sampling Frequency
Salinity	ppt	Grab	1/Quarter
Hardness	mg/L	Grab	1/Quarter

VII. LEGEND FOR MRP TABLES

Types of Samples

C-24 = composite sample, 24 hours (includes continuous sampling, such as for flows)

Frequency of Sampling

1/Week = once each week
1/Month = once each month
1/Quarter = once each calendar quarter (at about three month intervals)
2/Year = twice each calendar year (at about 6 months intervals, once during dry season, once during wet season)

Parameter and Unit Abbreviations

BOD_5	=	5-day biochemical oxygen demand
COD	=	chemical oxygen demand
TUc	=	chronic toxicity units
°F	=	degrees Fahrenheit
DO	=	dissolved oxygen
µg/L	=	micrograms per liter
µmhos/cm	=	micromhos/centimeter
MG	=	million gallons
MGD	=	million gallons per day
mg/L	=	milligrams per liter
% survival	=	percent survival
PAHs	=	polycyclic aromatic hydrocarbons
lbs/day	=	pounds per day
TSS	=	total suspended solids
s.u.	=	standard pH units

VIII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Discharger shall comply with all Federal Standard Provisions (Attachment D) and Regional Standard Provisions (Attachment G) related to monitoring, reporting, and recordkeeping.

B. Self Monitoring Reports (SMRs)

1. The Discharger shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program website (http://www.waterboards.ca.gov/ciwqs/index.html). The CIWQS website will provide additional directions for SMR submittal in the event of a service interruption for electronic submittal.

2. SMR Due Dates and Contents. The Discharger shall submit SMRs by the due dates specified below:

a. ***Monthly SMRs —*** Monthly SMRs shall be due 30 days after the end of each calendar month, covering that calendar month. The monthly SMR shall contain the applicable items described in sections V.B and V.C of both Attachments D and G of this Order. See Provision C.2 (Effluent Characterization Study and Report) of this Order for information that must also be reported with the monthly SMR.

b. ***Annual SMR —*** Annual SMRs shall be due February 1 each year, covering the previous calendar year. The annual SMR shall contain the items described in section V.C.1.f of the Regional Standard Provisions (Attachment G), and those specified in the Provisions section of this Order. See also Provision C.2d (Effluent and Receiving Water Selenium Characterization Study) of the Order for requirements to submit reports with the annual SMR.

c. ***Additional Specifications for Submitting SMRs to CIWQS —*** If the Discharger submits SMRs to CIWQS, it shall submit analytical results and other information using one of the following methods:

Table E-8. SMR Reporting for CIWQS

Parameter	Method of Reporting	
	EDF/CDF data upload or manual entry	**Attached File**
All parameters identified in influent, effluent, and receiving water monitoring tables (except Dissolved Oxygen and Temperature)	Required for All Results	
Dissolved Oxygen Temperature	Required for Monthly Maximum and Minimum Results Only (1)	Discharger may use this method for all results or keep records
Cyanide Arsenic Cadmium Chromium Copper Lead Mercury Nickel Selenium Silver Zinc Dioxins and Furans (by U.S. EPA Method 1613)	Required for All Results (2)	
Antimony Berylium Thallium Pollutants by U.S. EPA Methods 601, 602, 608, 610, 614, 624, and 625	Not Required (unless identified in influent, effluent, or receiving water monitoring tables), But Encouraged (1)	Discharger may use this method and submit results with application for permit reissuance, unless data submitted by CDF/EDF upload
Analytical Method	Not Required (Discharger may select "data unavailable") (1)	
Collection Time Analysis Time	Not Required (Discharger may select "0:00") (1)	

Footnotes for Table E-8:

(1) The Discharger shall continue to monitor at the minimum frequency specified in the monitoring tables, keep records of the measurements, and make the records available upon request.

(2) These parameters require EDF/CDF data upload or manual entry regardless of whether monitoring is required by this MRP or other provisions of this Order (except for biosolids, sludge, or ash provisions).

3. Monitoring periods for all required monitoring shall be completed according to the following schedule:

Table E-9. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous	Day after permit effective date	All
1/Hour	Day after permit effective date	Hourly
1/Day	Day after permit effective date	Midnight through 11:59 PM or any 24-hour period that reasonably represents a calendar day for purposes of sampling.
1/Week	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday
1/Month	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	1st day of calendar month through last day of calendar month
1/Quarter	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
2/Year	Closest of January 1 or July 1 following (or on) permit effective date	January 1 through June 30 July 1 through December 31
1/Year	January 1 following (or on) permit effective date	January 1 through December 31
2/5 Years or "twice per permit term"	Day after permit effective date	Once within the first 12 months, and once within 12 months prior to applying for permit reissuance.
1/Discharge Event	Anytime during the discharge event or as soon as possible after aware of the event	At a time when sampling can characterize the discharge event

4. The Discharger shall report with each sample result the applicable Reporting Level (RL) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR 136.

The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified" or DNQ. The estimated chemical concentration of the sample shall also be reported.

For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected" or "ND".

d. Dischargers are to instruct laboratories to establish calibration standards so that the ML (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve.

5. The Discharger shall submit SMRs in accordance with the following requirements:

a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with effluent limitations. The Discharger is not required to duplicate the submittal of data entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

b. The Discharger shall attach a cover letter to the SMR. The information in the cover letter shall clearly identify violations of the Waste Discharge Requirements, discuss corrective actions taken or planned, and specify the proposed time schedule for corrective actions. Identified violations shall include a description of the requirement that was violated and a description of the violation.

c. SMRs shall be submitted to the Regional Water Board, signed and certified as required by the Federal Standard Provisions (Attachment D), to the address listed below:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
ATTN: NPDES Wastewater Division

C. Discharge Monitoring Reports (DMRs)

1. DMRs shall be signed and certified as required by the Federal Standard Provisions (Attachment D). The Discharger shall submit the original DMR and one copy of the DMR to one of the addresses listed below:

Standard Mail	FedEx/UPS/Other Private Carriers
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

2. All discharge monitoring results shall be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format as EPA Form 3320-1.

IX. BYPASS REQUIREMENTS

If the Discharger bypasses any of its treatment units under the conditions stated in section I.G.2 of Attachment D, it shall monitor flows and collect samples daily at affected discharge points for all constituents with effluent limitations (except chronic toxicity) for the duration of the bypass (including acute toxicity using static renewals). Because such discharges may result in noncompliance that may endanger health or the environment, the Discharger shall follow the reporting requirements under of Attachment D, section V.E.1.

APPENDIX E-1
CHRONIC TOXICITY
DEFINITION OF TERMS AND SCREENING PHASE REQUIREMENTS

I. Definition of Terms

A. No observed effect level (NOEL) for compliance determination is equal to IC_{25} or EC_{25}. If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

B. Effective concentration (EC) is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC_{25} is the concentration of toxicant (in percent effluent) that causes a response in 25 percent of the test organisms.

C. Inhibition concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a nonlethal, nonquantal biological measurement, such as growth. For example, an IC_{25} is the estimated concentration of toxicant that would cause a 25 percent reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as USEPA's Bootstrap Procedure.

D. No observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

II. Chronic Toxicity Screening Phase Requirements

A. The Discharger shall perform screening phase monitoring:

1. Subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to source control efforts, or

2. Prior to permit reissuance. Screening phase monitoring data shall be included in the NPDES permit application for reissuance. The information shall be as recent as possible, but may be based on screening phase monitoring conducted within 5 years before the permit expiration date.

B. Design of the screening phase shall, at a minimum, consist of the following elements:

1. Use of test species specified in **Appendix E-2**, attached, and use of the protocols referenced in those tables, or as approved by the Executive Officer.

2. Two stages:

a. Stage 1 shall consist of a minimum of one battery of tests conducted concurrently. Selection of the type of test species and minimum number of tests shall be based on **Appendix E-2** (attached).

b. Stage 2 shall consist of a minimum of two test batteries conducted at a monthly frequency using the three most sensitive species based on the Stage 1 test results and as approved by the Executive Officer.

3. Appropriate controls.

4. Concurrent reference toxicant tests.

5. Dilution series 100%, 50%, 25%, 10%, 5%, 0 %, where "%" is percent effluent as discharged, or as otherwise approved the Executive Officer.

C. The Discharger shall submit a screening phase proposal acceptable to the Executive Officer. The proposal shall address each of the elements listed above. If within 30 days, the Executive Officer does not comment, the Discharger shall commence with screening phase monitoring.

APPENDIX E-2
SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

Critical Life Stage Toxicity Tests for Estuarine Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Alga	*(Skeletonema costatum)* *(Thalassiosira pseudonana)*	Growth rate	4 days	1
Red alga	*(Champia parvula)*	Number of cystocarps	7–9 days	3
Giant kelp	*(Macrocystis pyrifera)*	Percent germination; germ tube length	48 hours	2
Abalone	*(Haliotis rufescens)*	Abnormal shell development	48 hours	2
Oyster Mussel	*(Crassostrea gigas)* *(Mytilus edulis)*	Abnormal shell development; percent survival	48 hours	2
Echinoderms - Urchins Sand dollar	*(Strongylocentrotus purpuratus, S. franciscanus)* *(Dendraster excentricus)*	Percent fertilization	1 hour	2
Shrimp	*(Mysidopsis bahia)*	Percent survival; growth	7 days	3
Shrimp	*(Holmesimysis costata)*	Percent survival; growth	7 days	2
Topsmelt	*(Atherinops affinis)*	Percent survival; growth	7 days	2
Silversides	*(Menidia beryllina)*	Larval growth rate; percent survival	7 days	3

Toxicity Test References:

1. American Society for Testing Materials (ASTM). 1990. Standard Guide for Conducting Static 96-Hour Toxicity Tests with Microalgae. Procedure E 1218-90. ASTM, Philadelphia, PA.
2. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. August 1995.
3. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-90/003. July 1994.

Critical Life Stage Toxicity Tests for Fresh Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Fathead minnow	*(Pimephales promelas)*	Survival; growth rate	7 days	4
Water flea	*(Ceriodaphnia dubia)*	Survival; number of young	7 days	4
Alga	*(Selenastrum capricornutum)*	Cell division rate	4 days	4

Toxicity Test Reference:

4. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, third edition. EPA/600/4-91/002. July 1994.

Toxicity Test Requirements for Stage One Screening Phase

Requirements	Receiving Water Characteristics		
	Discharges to Coast	Discharges to San Francisco Bay[2]	
	Ocean	Marine/Estuarine	Freshwater
Taxonomic diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Number of tests of each salinity type: Freshwater[1] Marine/Estuarine	 0 4	 1 or 2 3 or 4	 3 0
Total number of tests	4	5	3

[1] The freshwater species may be substituted with marine species if:

(a) The salinity of the effluent is above 1 part per thousand (ppt) greater than 95 percent of the time, or

(b) The ionic strength (TDS or conductivity) of the effluent at the test concentration used to determine compliance is documented to be toxic to the test species.

[2] (a) Marine/Estuarine refers to receiving water salinities greater than 1 ppt at least 95 percent of the time during a normal water year.

(b) Fresh refers to receiving water with salinities less than 1 ppt at least 95 percent of the time during a normal water year.

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ATTACHMENT F – FACT SHEET

As described in section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. All other sections or subsections of this Order apply fully to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the Richmond Refinery.

Table F-1. Facility Information

WDID	2 071044001
Discharger	Chevron Products Company, a division of Chevron U.S.A. Inc. Chevron Chemical Company LLC, and General Chemical
Name of Facility	Richmond Refinery
Facility Address	841 Chevron Way
	Richmond, CA 94801
	Contra Costa County
Facility Contact, Title, Phone	Michael E. Coyle, General Manager, (510) 242-4400
Authorized Person to Sign and Submit Reports	Michael E. Coyle, General Manager, (510) 242-4400
Mailing Address	841 Chevron Way, Richmond, CA 94801
Billing Address	PO Box 1272, Richmond, CA 94802
Type of Facility	Petroleum Refinery
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	1A
Pretreatment Program	No
Reclamation Requirements	N/A
Facility Flow	Discharge Point No. 001: 27.5 million gallons per day (MGD) (maximum reported daily flow); 6.6 MGD (long-term average flow)
Watershed	San Francisco Bay
Receiving Water	San Pablo Bay and San Francisco Bay
Receiving Water Type	Estuarine

A. Chevron Products Company, a division of Chevron U.S.A., Inc, owns and operates the Richmond Refinery (hereinafter Facility). As described in Facility Description II.A, Chevron Chemical Company LLC discharges stormwater under this Order, and General Chemical routes wastewater and stormwater from the production of sulfuric acid to Chevron Products Company's wastewater treatment plant. Chevron Products Company, a division of Chevron U.S.A. Inc., Chevron Chemical Company LLC, and General Chemical are hereinafter collectively referred to as Discharger. For the purposes of this Order, references to the "Discharger" or "Permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. The Facility discharges treated wastewater and stormwater to San Pablo Bay and San Francisco Bay, waters of the United States, and is currently regulated by Order No. R2-2006-0035, which was adopted on June 14, 2006. Order No. R2-2006-0035 was amended by Order No. R2-2010-0057 (Amendment of Waste Discharge Requirements for San Francisco Bay Region Refineries), which amended effluent limitations for selenium. The Discharger is also regulated by Order No. R2-2007-0077 (NPDES Permit CA0038849) amended by Order No. R2-2011-0012, which supersedes all requirements on mercury and PCBs from wastewater discharges in the region. This Order does not affect Order No. R2-2007-0077, as amended.

C. The Discharger filed a Report of Waste Discharge and submitted an application for reissuance of its WDRs and NPDES permit on December 7, 2010.

II. FACILITY DESCRIPTION

A. Description of Wastewater Treatment or Controls

The discharge is made up of wastewater from the Chevron Richmond Refinery and General Chemical Corporation, Richmond Works. The major contributor of wastewater to the Facility is from the Chevron Richmond Refinery.

The Discharger owns and operates the Chevron Richmond Refinery, a petroleum refinery that produces a broad range of petroleum products and some petrochemicals. The Discharger reported that from May 2007 through April 2008 the refinery had a crude-run throughput of approximately 244,000 barrels per day (bbls/day). Refinery production rates can fluctuate for a variety of reasons, including maintenance shutdowns. Nonetheless, these data are consistent with more recent production data in 2010 of 228,000 bbls/day. The former Chevron Chemical Company Hensley Street and Castro Street Facility, managed by Chevron Environmental Management Company, is comprised of two locations referred to as the Hensley Street and Castro Street facilities. These locations were formerly used in the manufacture and formulation of fertilizers, pesticides, and fuel additives. These locations ceased operations about 15 years ago. The stormwater discharged from these areas is governed under this Order (Discharge Points 011 to 013). General Chemical, Richmond Works, produces sulfuric acid using spent alkylation acid and elemental sulfur. General Chemical's wastewater along with collected stormwater (which may include water from construction activities) is discharged to the wastewater treatment system for treatment.

The Chevron Richmond Refinery wastewater treatment system consists of an extensive network of drains, trunk lines, separators, and treatment areas servicing numerous plant areas throughout the refinery. Process water as well as non-process water from utility infrastructure and other operations enters the wastewater treatment system from many sources including process units, cooling water tower facilities and blowdown, fresh water treatment facilities (reverse osmosis plant), steam and electrical generation facilities, steam distribution systems, fire protection and safety systems, laboratories, and the General Chemical, Richmond Works, facility, as well as the recovered oil system and groundwater extraction systems. In addition, wastewater may also contain water generated from onsite and offsite activities including construction activities, marketing and pipeline activities, tank wash water, environmental remediation activities, inspection and maintenance activities, and other activities as described in the permit application. The average dry season flow is approximately 6.6 MGD, with wet season flows in excess of 20 MGD due to the introduction of processed stormwater. The Facility discharges treated process wastewater to San Pablo Bay through a submerged outfall and engineered diffuser via Discharge Point No. 001.

Process water is initially treated in one of three API separators (each servicing a distinct area of the refinery). Each separator consists of two or more parallel cells, not all of which are required depending on flow. Therefore, on any given day some cells may constitute auxiliary treatment consistent with 40 CFR 122.41(e). From the API separators, the Discharger routes wastewater to an aggressive biological treatment unit (ABTU) that consists of four quadrants. The first two quadrants provide biological treatment through aeration, while the next two quadrants are used as settling basins. The residence time of the ABTU is between 5 and 14 days. Treated wastewater from the ABTU may be routed to the 96-acre Richmond Refinery Enhancement Wetland pilot treatment facility, which the Discharger maintains as an adjunct effluent treatment process. The remaining bioreactor effluent, and typically all wetland effluent is routed through a granular activated carbon (GAC) facility that consists of 24 GAC vessels on 12 skids that may be operated in series (for normal operation) or parallel (during high flow conditions). The use of GAC units is flow dependent. Not all of the 24 units are typically required, and therefore, some of the single units may be considered auxiliary treatment pursuant to 40 CFR 122.41(e). The GAC facility serves to reduce effluent toxicity with the added benefit of some reduction in metals and hydrocarbons. Effluent is then routed to a compliance sampling station (E-001), and onward to San Pablo Bay. The discharge point is through a deepwater diffuser (average depth of 30 to 50 feet), approximately 2,000 feet offshore north of Point San Pablo. The Discharger has the option to discharge a portion of wetland effluent directly to Discharge Point No. 001 (downstream of the GAC facility) at a point prior to where representative samples for all parameters with effluent limits can be collected on the combined discharge, provided wetland effluent discharges do not exceed a daily maximum of 3 MGD, and do not cause acute toxicity.

Contact stormwater from the Facility is routed to one of the oil and water separators and/or may be sent to the ABTU directly and subsequently treated as described above. Stormwater from non-process industrial areas is collected in retention basins and can be discharged from the basins to the receiving water via several permitted stormwater outfalls discussed below. The stormwater retention basins can also be directed to the wastewater treatment system and/or the ABTU directly. Stormwater may include stormwater from construction activities, provided stormwater is discharged via controlled discharge points and the Discharger has updated its Stormwater Pollution Prevention Plan to show an equivalent level of protection as required by *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* Order No. 2009-0009-DWQ.

The Discharger uses tertiary treated recycled water from the East Bay Municipal Utility District's North Richmond Water Reclamation Plant in refinery cooling towers. Further, the East Bay Municipal Utility District owns and operates the Richmond Advanced Recycled Expansion (RARE) Facility, which is located at the Discharger's facility. The RARE facility treats secondary treated effluent from West County Wastewater District's Water Pollution Control Plant through microfiltration and reverse osmosis to produce high-purity recycled water suitable for boiler feedwater. Recycled water used onsite, and reverse osmosis reject water generated onsite may be discharged directly to the Discharger's wastewater treatment system.

B. Description of Stormwater Outfalls

1. **Discharge Point No. 002 (Richmond Long Wharf).** This controlled discharge consists of stormwater that falls on the wharf, and biologically-treated wastewater drawn from the wastewater treatment system. The use of biologically-treated wastewater in the Richmond Refinery fire protection system displaces vast quantities of potable water that would otherwise be required for these activities. The Discharger returns the majority of the water used to the

wastewater treatment plant, except for the portion used at the Richmond Long Wharf. Richmond Long Wharf discharges may also consist of bay water, residual steam condensate, and activities related to water rinsing the exterior of the Richmond Long Wharf pipelines. These routine discharges of biologically-treated wastewater (typically 0.0036 MG to 0.0128 MG) occur during housekeeping activities and tests of, or maintenance on, the fire protection system. The fire system testing discharges have occurred about once each week and last for about 10 minutes.

2. **Discharge Point No. 003 (North Yard Impoundment Basin).** This controlled discharge from an earthen basin consists mainly of stormwater, but other potential non-stormwater sources include incidental estimated quantities of 5,000 gallons of steam condensate, non-contact bay water, groundwater seepage, hydrotest water, and water from fire protection systems that may remain in the basin and mixes with stormwater during the controlled discharges. Hydrotest water is routed to the basin prior to being sent to the ABTU. Stormwater runoff originates from an area of approximately 407 acres from areas within the: Poleyard and Alkane Tankfields and adjacent hill sides; LPG and Ammonia Storage Facilities; Former Oxidation Ponds 2-5, Cracking and Hydroprocessing facilities and processing areas; and Hydropits Cap. The North Yard Impound Basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Pablo Bay. Discharge may also include water from Discharge Point-008.

3. **Discharge Point No. 004 (12-Basin).** This discharge consists of stormwater runoff from an area of approximately 3 acres in the former Point Orient Tankfield. 12-Basin discharges to San Francisco Bay. 12-Basin may also be transferred to the 10-Basin and discharged at Discharge Point No. 006.

4. **Discharge Point No. 005 (11-Basin).** This discharge consists of stormwater runoff from an area of approximately 4 acres located in a former Point Orient Tankfield area. Discharge Point No. 005 discharges into San Francisco Bay.

5. **Discharge Point No. 006 (10-Basin).** This discharge consists of stormwater runoff from an area of approximately 48 acres located in a former Point Orient Tankfield area. In addition, stormwater from 12-Basin (approximately 4 acres) and the Horse Pasture area (approximately 17 acres) may run onto the site. Discharge Point No. 006 discharges into San Francisco Bay.

6. **Discharge Point No. 007 (Horse Pasture, Basin 13).** This discharge consists of stormwater runoff from an area of approximately 17 acres located in a former Point Orient Tankfield area. Discharge Point No. 007 discharges into San Francisco Bay.

7. **Discharge Point No. 008 (Tank Field 100' Channel).** This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, groundwater seepage, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 496 acres in and around the Main Tankfield, Distillation and Reforming facilities, Main and South Yard areas, rail car loading areas, former Asphalt Plant area, and Cogeneration Facility. This earthen basin provides treatment of stormwater via

physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Pablo Bay. This discharge may also be discharged as part of Discharge Point 003.

8. **Discharge Point No. 009 (8-Basin).** This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, groundwater seepage, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 26 acres within the Quarry Tankfield. During unusual circumstances (i.e., emergency based events, special conditions), non-stormwater may be stored in the basin. This non-stormwater will be dealt with in a manner acceptable to the Regional Water Board. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

9. **Discharge Point No. 010 (Reclamation Area).** This discharge consists of stormwater runoff from an area of approximately 6 acres that is a portion of the Reclamation Yard area. Discharge Point No. 010 discharges into Wildcat Creek via the Gertrude Street Ditch, which then drains to Wildcat Creek, which drains to Castro Creek, a tributary of San Pablo Bay.

10. **Discharge Point No. 011 (Former Chevron Chemical Company Hensley Street Plant Runoff).** This controlled discharge consists mainly of stormwater runoff, but may include water from the following non-stormwater sources: groundwater, irrigation water, and potable water from the firewater system and facility wash downs. The stormwater runoff, which is drained from an area of approximately 36 acres within the former Chevron Chemical Company Hensley Street Plant, is collected at the Castro Acres surge pond (located along the east side of Castro Street).

    Water collected in the Castro Acres surge pond is not permitted to discharge to surface waters under typical rainfall conditions since the stormwater runoff may contain trace contaminants. Typically, the collected water is discharged to the Integrated Wastewater Pond System (IWPS), which provides necessary surge capacity before discharge to the City of Richmond's Wastewater Treatment Plant. However, during periods of high intensity rainfall (i.e., in excess of a 25-year, 24-hour rainfall event), a limited quantity of stormwater from the drainage area may be discharged from the Castro Acres surge pond into Castro Creek via a drainage ditch on the east side of Castro Street, identified as Discharge Point No. 011.

11. **Discharge Point No. 012 (Fertilizer Evaporation Pond).** This discharge consists of stormwater runoff from a clean-filled vegetative capped area. Runoff originates from an area of approximately 19 acres within the former Chevron Chemical Company's Castro Street facility, which was formerly used to manufacture fertilizer. Stormwater from this location is currently routed to the City of Richmond's Wastewater Treatment Plant. In the future, the Discharger may route stormwater from this area directly to Castro Creek.

12. **Discharge Point No. 013 (IWPS**). This discharge consists of stormwater from direct rainfall onto sections of the former Chevron Chemical Company's IWPS, an area of approximately

81 acres of synthetically-lined surface impoundments. Potential non-storm wastewaters include water from irrigation and groundwater. Depending on annual precipitation, various sections of the IWPS could receive flows from the former Chevron Chemical Company's Hensley Street Plant site and the Fertilizer Evaporation Pond. Contributing stormwater runoff from an adjacent 4-acre capped Class II waste management unit (Soil Management Unit No.1) may also commingle with stormwater from the IWPS. Stormwater (and associated non-stormwater discharges) are typically discharged to the City of Richmond's Wastewater Treatment Plant. With approval from the Executive Officer, Chevron may discharge from Discharge Point No. 013 to Castro Creek, a tributary of San Pablo Bay.

13. **Discharge Point No. 014 (Consolidation Area).** This discharge consists of stormwater runoff from a capped waste management unit area of approximately 5 acres. Runoff from the Consolidation Area is discharged to Castro Creek, a tributary of San Pablo Bay.

14. **Discharge Point No. 015 (1-Basin).** This discharge consists of stormwater runoff from an area of approximately 4 acres in a former tankfield area of the Office Hill Tankfield. Order No. R2-2006-0035 had indicated that the 1-Basin discharged through Discharge Point No. 015 to Discharge Point E-020. Historically, the Discharger used the 1-Basin as spill containment for tanks within the area. However, the Discharger has dismantled the tanks and there is no industrial activity in this area. The Discharger has requested that the 1-Basin be permitted to discharge through Discharge Point No. 020. Therefore, this Order requires that the Discharger evaluate compliance for discharges from this area at Discharge Point 020.

15. **Discharge Point No. 016 (2-Basin).** This discharge consists of stormwater runoff from an area of approximately 5 acres in a former tankfield area of the Office Hill Tankfield. Order No. R2-2006-0035 had indicated that the 2-Basin discharged through Discharge Point No. 016 to Discharge Point E-020. Historically, the 2-Basin was used as spill containment for tanks within the area. However, the Discharger has dismantled the tanks and there is no industrial activity in this area. The Discharger has requested that the 2-Basin be permitted to discharge through Discharge Point No. 020. Therefore, this Order requires that the Discharger evaluate compliance for discharges from this area at Discharge Point 020.

16. **Discharge Point No. 017 (3-Basin).** This controlled discharge (including 3A Basin discharge) from an earthen basin consists of stormwater runoff from an area of approximately 7 acres in a former tankfield area of the Office Hill Tankfield. Additional non-stormwater wastewaters include water from the fire protection system. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

17. **Discharge Point No. 018 (9-Basin).** This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 29 acres in the Quarry Tankfield. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

18. **Discharge Point No. 019 (7-Basin**). This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 20 acres in the SP Hill Tankfield. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

19. **Discharge Point No. 020 (Castro Street, 1-Basin, 2-Basin).** This discharge consists of stormwater runoff from the City of Richmond's stormwater management system. Specifically, this discharge consists of: (1) stormwater runoff that drains an area of approximately 260 acres at Castro Street; (2) stormwater runoff from an area of approximately 4 acres in a former tankfield area of the Office Hill Tankfield that is collected at 1-Basin; and (3) stormwater runoff from an area of approximately 5 acres in a former tankfield area of the Office Hill Tankfield that is collected at 2-Basin. Stormwater from the three locations and water from the City of Richmond's storm sewers are routed to the Castro Street Pump Station. The Pump Station pumps water to Chevron's 38' Channel, which discharges into Castro Creek, which then flows to San Pablo Bay. In previous Orders, stormwater runoff from 1-Basin and 2-Basin were discharged through Discharge Point Nos. 015 and 016, respectively. However, as explained in section II.F.2 of this Fact Sheet, this Order permits the discharge of stormwater from 1-Basin and 2-Basin through Discharge Point No. 020.

20. **Discharge Point No. 021 (Landfill 15).** This discharge consists of stormwater runoff from a capped waste management unit area of approximately 41 acres. Runoff from Landfill 15 discharges to Castro Creek, a tributary of San Pablo Bay.

21. **Discharge Point No. 022 (Parr-Richmond).** This discharge consists of stormwater runoff from a capped waste management unit area of approximately 24 acres. Runoff from the Parr-Richmond Site discharges to Wildcat Creek and Gertrude Street ditch (which drains to Wildcat Creek). Wildcat Creek drains to Castro Creek, a tributary of San Pablo Bay.

22. **Discharge Point No. 023 (Gertrude Street**). This discharge consists of stormwater runoff from a 3-acre drainage area which collects at the Gertrude Street Ditch. Stormwater in the Gertrude Street Ditch discharges to Wildcat Creek, which drains to Castro Creek, a tributary of San Pablo Bay.

C. Discharge Points and Receiving Waters

The receiving water and the location of the discharge points are shown in Table F-2 below. Compliance monitoring is conducted at Monitoring Locations E-001 through E-023 as described in Attachment E, Monitoring and Reporting Program (MRP). San Pablo Bay is located in the San Pablo Bay Watershed.

Table F-2. Outfall Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Treated wastewater	37º 58’ 15” N	122º 25’ 45” W	San Pablo Bay
002	Richmond Long Wharf	37º 55’ 15” N	122º 24’ 30” W	San Francisco Bay
003	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
004	Stormwater	37º 57’ 15” N	122º 24’ 45” W	San Francisco Bay
005	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
006	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
007	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
008	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
009	Stormwater	37º 56’ 00” N	122º 24’ 15” W	San Francisco Bay
010	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
011	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
012	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
013	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
014	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
015	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay via 020
016	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay via 020
017	Stormwater	37º 55’ 45” N	122º 24’ 30” W	San Francisco Bay
018	Stormwater	37º 55’ 45” N	122º 24’ 00” W	San Francisco Bay
019	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
020	Stormwater	37º 57’ 15” N	122º 23’ 15” W	Castro Creek to San Pablo Bay
021	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
022	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
023	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay

D. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

1. **Effluent Limitations and Monitoring Data at Discharge Point No. 001.** Effluent limitations for discharges to San Pablo Bay contained in the previous Order, and representative monitoring data for Discharge Point No. 001 are as follows:

Table F-3. Historical Effluent Limitations and Monitoring Data for Conventional and Non-Conventional Pollutants for Discharge Point No. 001

Parameter	Units	Effluent Limitations		Monitoring Data (From June 2006 to November 2010)[1]	
		Monthly Average	Daily Maximum	Highest Monthly Average	Highest Daily Discharge
Biochemical Oxygen Demand (5-day @ 20 °C) (BOD)	lbs/day	5,100	9,600	3,072	3,072
Total Suspended Solids (TSS)	lbs/day	4,200	6,600	1,471	1,471
Total Organic Carbon (TOC)	lbs/day	11,000	21,000	2,274	2,274
Oil and Grease	lbs/day	1,600	3,000	194	194
	mg/L	8	15	3.53	3.53
Phenolic Compounds	lbs/day	22	70	2.3	2.3
Ammonia as N	lbs/day	1,900	4,200	368	368
Sulfide	lbs/day	28	62	4.2	4.2
Settleable Solids	mL/L-hr	0.1	0.2	<0.1	<0.1
Total Chromium	lbs/day	25	72	1.1	1.1
Hexavalent Chromium	lbs/day	2.1	4.6	0.33	0.33
pH	standard units	6.0 – 9.0		6.1 – 8.9	

NR = Not Reported
[1] As reported in the Report of Waste Discharge.

Table F-4. Historical Effluent Limitations and Monitoring Data for Toxic Pollutants at Discharge Point No. 001

Parameter	Units	Final Limits		Interim Limits[1]		Monitoring Data (From September 2005 to March 2010)
		Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Highest Daily Concentration
Copper	µg/L	25	13	--	--	6.2
Lead	µg/L	15	7.4	--	--	1.7
Mercury[1]	µg/L	0.046	0.017	--	0.075	0.070
Nickel	µg/L	66	45	--	--	27
Selenium[1]	µg/L	7.4	4.4	34	--	47
Cyanide[1]	µg/L	6.4	3.7	25	--	21
Heptachlor Epoxide	µg/L	0.0018	0.00088	--	--	ND (0.002)[2]
Polychlorinated Biphenyls (PCBs) (Sum) [1]	µg/L	0.00034	0.00017	0.5	--	ND (0.02)[2]
TCDD Equivalents[3]	µg/L	--	--	1.0×10^{-7}	--	4.6×10^{-8}
Acute Toxicity	Percent	--	[4]	--	--	98[5]/98[6]
Chronic Toxicity	TUc	--	[7]	--	--	7.6[8]/8.8[9]

[1] Interim limits were effective until April 27, 2010, for cyanide, selenium, and mercury; and interim limits for PCBs were effective until May 17, 2010. For selenium, Order No. R2-2010-0057 (permit amendment for selenium) required that the Discharger not exceed an annual running average for selenium of 0.92 kg/day. In 2010, the Discharger's annual running average ranged from 0.29 to 0.38 kg/day, which was well below the prescribed mass limit.
[2] Analyte not detected in effluent. Number is the lowest method detection limit (MDL) as reported by the analytical laboratory.
[3] The interim limit shall remain effective until June 30, 2011, or until the Board amends the limits based on site-specific objectives on the Waste Load Allocations in the TMDLs.
[4] The survival of bioassay test organisms in 96-hour bioassays of undiluted effluent shall be: (1) an 11 sample median value of not less than 90% survival; and (2) an 11 sample 90th percentile value of not less than 70% survival.
[5] Minimum 11-sample median percent survival. Compliance data collected between January 2009 and January 2010.
[6] Minimum 11-sample 90th percentile survival. Compliance data collected between January 2009 and January 2010.
[7] The survival of bioassay test organisms in the discharge shall be: (1) a three-sample median value equal to or less than 10 TUc; and (2) a single-sample value equal to or less than 20 TUc.
[8] Maximum three sample median of compliance data collected from August 2006 through December 2009.
[9] Maximum single sample value of compliance data collected from August 2006 through December 2009.

3. Stormwater Data from Discharge Points 002-023

The following tables include the quality of stormwater runoff from June 2006 through November 2010. During this period, the Discharger did not discharge to San Pablo Bay or San Francisco Bay from several discharge points, and therefore, summary data is not available for these outfalls.

a. Discharge Point No. 002, Richmond Long Wharf

Table F-5 – E-002 Monitoring Data

Pollutant	MAX	AVG	Units
HEM[1]	7.5	2.57	mg/L
pH	8.6	7.9	S.U.
Specific Conductance (EC)	44,800	8,519	umhos/cm
Total Organic Carbon	23.9	14.4	mg/L
Total Suspended Solids	105	23.4	mg/L

[1] HEM = Hexane Extractable Material (Oil & Grease)

b. Discharge Point No. 003, North Yard Impound Basin

Table F-6 – E-003 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.39	1.02	mg/L
pH	7.43	7.27	S.U.
Specific Conductance (EC)	2070	1402	umhos/cm
Total Organic Carbon	11.86	10.11	mg/L
Total Suspended Solids	74.80	39.95	mg/L

c. Discharge Point Nos. 004 – 007 (10-13 Basins). These basins are located on the west side of the San Pablo Peninsula ridge. In this area, the Discharger indicates that all tanks associated with operations were dismantled, and that all operations ceased by 1996. Because there is no industrial activity and past samples show that discharges from these areas comply with effluent limits, Order No. R2-2006-0035 did not require monitoring of these basins.

d. **Discharge Point No. 008, Tank Field.** The Discharger indicates that operationally it is easier to route stormwater from this area directly to its wastewater treatment plant. For this reason, there were no discharges from this location in the last five years.

e. **Discharge Point No. 009, 8 Basin**

Table F-7 – E-009 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.1	0.31	mg/L
pH	8.47	7.99	S.U.
Specific Conductance	1681	891.7	umhos/cm
Total Organic Carbon	22.42	9.14	mg/L
Total Suspended Solids	133	21.41	mg/L

f. **Discharge Point No. 010, Reclamation Area**

Table F-8 – E-010 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	4.82	1.06	mg/L
pH	8.73	8.19	S.U.
Specific Conductance (EC)	578	258	umhos/cm
Total Organic Carbon	9.02	4.12	mg/L
Total Suspended Solids	582	119	mg/L

g. **Discharge Point Nos. 011 – 013**. The Discharger has not discharged from these locations in the last five years. This is because operationally the Discharger has chosen to route stormwater from these locations to the City of Richmond's wastewater treatment plant. To discharge stormwater from Discharge Points 011 and 013, the Discharger must document that it only contains non-contaminated stormwater and receive approval from the Executive Officer.

h. **Discharge Point No. 014, Consolidation Area**

Table F-9 – E-014 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.57	3.57	mg/L
pH	8.47	7.74	S.U.
Specific Conductance (EC)	3,590	778	umhos/cm
Total Organic Carbon	39	18	mg/L
Total Suspended Solids	63	13	mg/L

i. **Discharge Point Nos. 015 and 016 (1-Basin and 2-Basin).** During the past five years, the Discharger has chosen to route stormwater from these locations to its wastewater treatment

plant. This is because operationally these are difficult locations to access and collect samples.

j. Discharge Point No. 017, 3-Basin

Table F-10 – E-017 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.52	0.38	mg/L
pH	7.32	7.17	S.U.
Specific Conductance (EC)	159	155	umhos/cm
Total Organic Carbon	12.40	10.66	mg/L
Total Suspended Solids	14.00	9.60	mg/L

k. Discharge Point No. 018, 9-Basin

Table F-11 – E-018 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.94	0.45	mg/L
pH	8.40	7.99	S.U.
Specific Conductance (EC)	696	587	umhos/cm
Total Organic Carbon	10.37	8.88	mg/L
Total Suspended Solids	43.25	9.98	mg/L

l. Discharge Point No. 019, 7-Basin

Table F-12 – E-019 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	2.21	0.96	mg/L
pH	7.53	7.41	S.U.
Specific Conductance (EC)	2980	1761	umhos/cm
Total Organic Carbon	20.28	13.98	mg/L
Total Suspended Solids	43.50	19.70	mg/L

m. Discharge No. Point 020, Castro Street

Table F-13 – E-020 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.0	1.0	mg/L
pH	7.9	7.5	S.U.
Specific Conductance (EC)	4330	2449	umhos/cm
Total Organic Carbon	12.5	7.7	mg/L
Total Suspended Solids	91.2	31.8	mg/L

n. Discharge Point No. 021, Landfill 15

Table F-14 – E-021 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.83	0.20	mg/L
pH	8.31	7.95	S.U.
Specific Conductance (EC)	703	363	umhos/cm
Total Organic Carbon	19	8.12	mg/L
Total Suspended Solids	35.60	11.91	mg/L

o. Discharge Point No. 022, Parr-Richmond

Table F-15 – E-022 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	2.27	0.83	mg/L
pH	7.74	7.60	S.U.
Specific Conductance (EC)	56	40	umhos/cm
Total Organic Carbon	3.46	2.30	mg/L
Total Suspended Solids	90	33.88	mg/L

p. Discharge Point No. 023, Gertrude Street

Table F-16 – E-023 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.76	0.25	mg/L
pH	7.74	7.40	S.U.
Specific Conductance (EC)	971	288	umhos/cm
Total Organic Carbon	9.36	5.22	mg/L
Total Suspended Solids	27.67	7.37	mg/L

E. Compliance Summary

1. **Compliance and Enforcement.** The Discharger violated its daily maximum effluent limit for selenium in May 2008, and submitted its 2008 Annual Stormwater Report more than 30 days late. To address these violations, the Regional Water Board issued a Notice of Violation, dated February 5, 2009, that also allowed the Discharger to settle these violations by offering a payment of $6,000. The Discharger made payment on June 19, 2009.

   Additionally, the Discharger violated its pH limitation at Discharge Point 010 (Stormwater outfall). On December 12, 2009, the Discharger reported a value of 8.73, which exceeded the maximum pH allowed of 8.5. The Regional Water Board has chosen not to formally address this violation, in part, because the excursion was of a small magnitude, and therefore, was not subject to a mandatory penalty under Section 13385(h) and (i) of the California Water Code.

2. **Reported Spills.** The Discharger reported 24 spills of toxic or hazardous pollutants at the Facility between July 9, 2007, through November 29, 2010. Of the 24 reported spills within

this time frame, six of the spills were directly to the San Francisco Bay. The largest spill to surface waters consisted of 2 gallons of oil and water mixture.

F. Planned Changes

1. **Modification to North Yard Impoundment Basin.** The Discharger plans to make modifications to the North Yard Impound Basin in order to collect stormwater draining from the areas known as Passes 2 through 5. These modifications are being undertaken in order to comply with the requirements of Order No. R2-2006-0078, which requires remediation of sediment in a portion of Castro Cove. These areas were formerly elements of an oxidation pond that is currently being remediated according to general clean closure standards for closure and post-closure site requirements contained in Title 27. Modifications will be made such that surface water from Passes 2 through 5 drain to the North Yard Impoundment Basin. Groundwater will be pumped to the Aggressive Biological Treatment System.

2. **Discharge Point 012.** The Discharger proposes to modify, within the next five years, the location of stormwater discharges at Discharge Point 012. This potential discharge would consist of stormwater runoff from an area of approximately 19 acres within the former Chevron Chemical Company LLC's Castro Street facility that was historically used to manufacture fertilizer until 1996. In 2002, the Discharger filled the former fertilizer pond and topped it with a vegetative cap. The Discharger is proposing to regrade this area so stormwater would drain to a vegetated swale before discharge to Castro Creek. As no industrial activity occurs in this area, the Discharger indicates that the quality of stormwater runoff should be comparable to other undeveloped areas at the facility.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements in this Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to federal Clean Water Act (CWA) section 402 and implements regulations adopted by United States Environmental Protection Agency (USEPA), and pursuant to California Water Code (CWC) Chapter 5.5, Division 7 (commencing with section 13370). It shall serve as an NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC Article 4, Chapter 4, Division 7 (commencing with section 13260).

B. California Environmental Quality Act (CEQA)

Under CWC section 13389, this action to adopt an NPDES permit is exempt from CEQA provisions.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** *The Water Quality Control Plan for the San Francisco Bay Basin* (hereinafter Basin Plan) is the Regional Water Quality Control Board, San Francisco Bay Region's (Regional Water Board's) master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including

surface waters and groundwater. It also includes programs of implementation to achieve the water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Quality Control Board (State Water Board), the Office of Administrative Law (OAL), and USEPA, as required. Requirements of this Order implement the Basin Plan.

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives, and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that applied in the State. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority toxic pollutants that apply to San Pablo Bay.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP*).* The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria USEPA promulgated for California through the NTR and to the priority pollutant objectives the Regional Water Board established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria USEPA promulgated through the CTR. On February 24, 2005, the State Water Board adopted amendments to the SIP that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and tribal water quality standards (WQS) become effective for CWA purposes [65 Fed. Reg. 24641 (April 27, 2000) (codified at 40 CFR 131.21)]. Under the revised regulation (also known as the Alaska Rule), USEPA must approve any new and revised standards submitted to USEPA after May 30, 2000, before they can be used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

5. **Antidegradation Policy.** 40 CFR 131.12 requires that State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law. It also requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Antidegradation is discussed further in Fact Sheet section IV.D.2.

6. **Anti-Backsliding Requirements.** CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permits, with some exceptions where limitations may be relaxed. Some effluent limitations in this Order are less stringent than those in the previous Order. Anti-backsliding is discussed further in Fact Sheet section IV.D.1.

D. Impaired Water Bodies on CWA 303(d) List

In November 2006, the USEPA approved a revised list of impaired water bodies prepared by the State [hereinafter referred to as the 303(d) list], prepared pursuant to provisions of CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. San Pablo Bay and Central San Francisco Bay are listed as an impaired waterbody for chlordane, DDT, dieldrin, dioxin compounds, invasive species, furan compounds, mercury, PCBs, dioxin-like PCBs, and selenium. The SIP requires final effluent limitations for all 303(d)-listed pollutants to be consistent with total maximum daily loads (TMDLs) and associated waste load allocations. The Regional Water Board plans to adopt TMDLs for pollutants on the 303(d) list. On February 12, 2008, USEPA approved a TMDL for mercury in San Francisco Bay. On March 29, 2010, USEPA approved a TMDL for PCBs in San Francisco Bay. Regional Water Board Order No. R2-2007-0077, as amended, implements these TMDLs.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the NPDES regulations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where reasonable potential has been established for a pollutant, but there is no numeric objective for the pollutant, water quality-based effluent limitations may be established: (1) using USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) on an indicator parameter for the pollutant of concern; or (3) using a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

A. Discharge Prohibitions

1. **Discharge Prohibition III.A (No discharge different from that described in this Order):** This prohibition is the same as in the previous Order and is based on 40 CFR 122.21(a), duty to apply, and CWC section 13260, which requires filing a Report of Waste Discharge before discharges can occur. Discharges not described in the Report of Waste Discharge, and subsequently in this Order, are prohibited.

2. **Discharge Prohibition III.B (Discharge that does not receive a minimum 34:1 dilution):** This Order allows a conservative estimate of the actual initial dilution of 34:1 to calculate WQBELs for ammonia. This is discussed further in section IV.C.4.b of this Order. These

WQBELs would not be protective of water quality if the discharge did not actually achieve at least a 34:1 minimum initial dilution, thus this prohibition is necessary and warranted.

This Order permits discharge of stormwater from 20 outfalls that do not provide an initial dilution of at least 10:1. Though Discharge Prohibition No. 1 of the Basin Plan prohibits discharges having characteristics of particular concern that do not receive a minimum 10:1 initial dilution, the Basin Plan further indicates that the prohibition is to address discharges of treated sewage and other discharges where the treatment process is subject to upset. Since these stormwater discharges do not contain treated sewage or wastewater from a treatment process subject to upset, the prohibition does not apply to these stormwater discharges.

3. **Discharge Prohibition III.C (No bypass or overflow of untreated or partially treated wastewaters):** This prohibition is retained from the previous Order and based on 40 CFR 122.41(m) (see federal Standard Provisions, Attachment D).

4. **Discharge Prohibition III.D (No discharge except during 25-year, 24-hour storm event):** This prohibition is retained from the previous Order. The drainage area for Discharge Point No. 011 includes the site of the former Chevron Chemical Company and may contain contaminated stormwater. This prohibition is necessary to minimize the potential for the discharge of contaminated stormwater.

5. **Discharge Prohibition III.E (No discharge without Executive Officer approval):** This prohibition is retained from the previous Order and is necessary to ensure that contaminated stormwater is not discharged from this basin (Discharge Point 013) in the event of an extreme storm event.

6. **Discharge Prohibition III.F (No discharge of wetland effluent directly to Discharge Point No. 001):** This prohibition is retained from the previous Order and necessary to ensure adequate treatment of wastewater discharged to the receiving water.

B. Technology-Based Effluent Limitations

1. Scope and Authority

CWA section 301(b) and 40 CFR 122.44(a) require that permits include applicable technology-based limitations based on several levels of control:

a. Best practicable treatment control technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants. Conventional pollutants include BOD, TSS, pH, and oil and grease.

b. Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

c. Best conventional control technology (BCT) represents the control from existing industrial point sources of conventional pollutants. The BCT standard is established after considering

the "cost reasonableness" of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and also the cost effectiveness of additional industrial treatment beyond BPT.

d. New source performance standards (NSPS) represent the best available demonstrated control technology standards for new sources. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

Where USEPA has not yet developed technology-based standards for a particular industry or a particular pollutant, CWA section 402(a)(1) and 40 CFR 125.3 authorize the use of BPJ to derive technology-based effluent limitations on a case-by-case basis. When BPJ is used, the permit must reflect specific factors outlined at 40 CFR 125.3.

USEPA has established standards of performance (technology-based limitations and standards) for the petroleum refining industry at 40 CFR 419, *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category*. Subpart E of these regulations for the Integrated Subcategory apply to discharges from the Facility and have been used to develop limitations and requirements of this Order.

2. Applicable Technology-Based Effluent Limitations

a. Technology-Based Effluent Limitations – Discharge Point No. 001

i. Process Wastewater Mass-Based Effluent Limitations

40 CFR 419 Subpart E requires that technology-based effluent limitations for Discharge Point No. 001 be derived based on refinery production (the total crude oil throughput of the Facility) and the treatment processes used. The Facility currently operates with a maximum crude oil throughput of 244,000 bbls/day. Attachment F-1 presents the derivation of the production-based effluent limitations based on 40 CFR 419 Subpart E.

ii. Effluent Limitation Allocations for Contaminated Runoff and Ballast Water

Additional effluent limitation allocations for contaminated runoff commingled with process wastewater are developed from requirements in 40 CFR 419.53(f)(2) and 419.52(e)(2). These allocations are in addition to the process wastewater mass-based limitations. A full description of the additional effluent limitation allocations for Discharge Point No. 001 can be found in Attachment F-1 to this Order.

Additional ballast water (i.e., cargo hold wash water) effluent limitation allocations are developed from requirements in 40 CFR 419.52(c), 419.53(d), and 419.54(c). These allocations are in addition to the process wastewater mass-based limitations. A full description of the additional effluent limitation allocations for Discharge Point No. 001 can be found in Attachment F-1 to this Order.

C. Water Quality-Based Effluent Limitations (WQBELs) for Toxic Substances

1. Scope and Authority

a. 40 CFR 122.44(d)(1)(i) requires permits to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard (Reasonable Potential). The process for determining Reasonable Potential and, when necessary, calculating WQBELs is intended to (1) protect the designated beneficial uses of the receiving water, and (2) achieve applicable WQOs in the CTR, NTR, and the Basin Plan.

b. NPDES regulations and the SIP provide the basis to establish Maximum Daily Effluent Limitations (MDELs).

i. NPDES Regulations. 40 CFR 122.45(d) states "For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall *unless impracticable* be stated as maximum daily and average monthly discharge limitations for all discharges other than publicly owned treatment works."

ii. SIP. SIP section 1.4 requires that WQBELs be expressed as MDELs and average monthly effluent limitations (AMELs).

2. Applicable Beneficial Uses and Water Quality Objectives

a. The Basin Plan implements State Water Board Resolution No. 88-63, which establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply (MUN). Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in San Francisco Bay commonly (and often significantly) exceed 3,000 mg/L and thereby meet an exception to State Water Board Resolution No. 88-63. The designation MUN does not apply to the San Pablo Bay. Beneficial uses applicable to the San Pablo Bay and Central San Francisco Bay are as follows:

Table F-17. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001, 003, 008, 010-014, and 020-023	San Pablo Bay	Industrial Service Supply (IND) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

Discharge Point	Receiving Water Name	Beneficial Use(s)
002, 004-007, 009, and 017-019	Central San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PRO) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

b. The WQOs applicable to the receiving waters for this discharge are from the Basin Plan; the CTR, established by USEPA at 40 CFR 131.38; and the NTR, established by USEPA at 40 CFR 131.36. Some pollutants have WQOs established by more than one of these three sources.

i. Basin Plan. The Basin Plan specifies numeric WQOs for 10 priority toxic pollutants, as well as narrative WQOs for toxicity and bioaccumulation in order to protect beneficial uses. The pollutants for which the Basin Plan specifies numeric objectives are arsenic, cadmium, hexavalent chromium, copper in freshwater, lead, mercury, nickel, silver, zinc, and cyanide. The Basin Plan's narrative toxicity objective (section 3.3.18) states in part, "[a]ll waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms." The bioaccumulation objective states in part, "[c]ontrollable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered."

Effluent limitations and provisions contained in this Order are based on available information to implement these objectives.

ii. CTR. The CTR specifies numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. These criteria apply to all inland surface waters and enclosed bays and estuaries of the San Francisco Bay Region, although Basin Plan Tables 3-3 and 3-4 include numeric objectives for certain priority toxic pollutants that supersede CTR criteria north of the Dumbarton Bridge.

iii. NTR. The NTR establishes numeric aquatic life criteria for selenium, numeric aquatic life and human health criteria for 33 other toxic organic pollutants for waters of San Pablo Bay. These NTR criteria apply to San Pablo Bay, the receiving water for Discharge Point No. 001 for this Discharger.

iv. Technical Support Document for Water Quality-Based Toxics Controls. Where numeric objectives have not been established or updated in the Basin Plan, 40 CFR 122.44(d) requires that WQBELs be established based on USEPA criteria,

supplemented where necessary by other relevant information, to attain and maintain narrative WQOs to fully protect designated beneficial uses. To determine the need for WQBELs and establish them when necessary, the Regional Water Board has followed the requirements of applicable NPDES regulations, including 40 CFR 122 and 131, as well as guidance and requirements established by the Basin Plan; USEPA's *Technical Support Document for Water Quality-Based Toxics Control* (the TSD, EPA/505/2-90-001, 1991); and the State Water Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, 2005* (SIP).

v. **Sediment Quality Objectives.** The Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality contains a narrative WQO, "Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California." This WQO is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The Policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this WQO, it is to impose the WQO as a receiving water limit.

vi. **Basin Plan Receiving Water Salinity Policy and Hardness.** The Basin Plan states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water shall be considered in determining the applicable WQO. Freshwater criteria shall apply to discharges to waters with salinities equal to or less than one ppt at least 95 percent of the time. Saltwater criteria shall apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities in between these two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the criteria shall be the lower of the salt or freshwater criteria, (the latter calculated based on ambient hardness), for each substance.

The receiving water for the subject discharge is San Pablo Bay, which is a tidally influenced waterbody, with significant fresh water inflows during the wet weather season. San Pablo Bay is specifically defined as estuarine under the Basin Plan salinity definition. Therefore, the effluent limitations specified in this Order for discharges to San Pablo Bay are based on the lower of the marine and freshwater Basin Plan WQOs and CTR and NTR WQC. Some WQOs and WQC are hardness dependent. Hardness data collected through the RMP are available for water bodies in the San Francisco Bay Region. In determining the WQOs and WQC for this Order, the Regional Water Board used a hardness of 59 mg/L, which is the minimum hardness at the Pinole Point Station observed from 1993-2008. This represents the best available information for hardness of the receiving water after it has mixed with the discharge.

vii. **Site-Specific Metal Translators.** 40 CFR 122.45(c) requires effluent limitations for metals to be expressed as total recoverable metal. Because applicable water quality criteria for the metals are typically expressed in the dissolved form, factors or translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. In the CTR, USEPA establishes default translators that are used in NPDES permitting activities; however, site-specific conditions, such as water temperature, pH, suspended solids, and organic carbon, greatly impact the form of

metal (dissolved, filterable, or otherwise) present and therefore available in the water to cause toxicity. In general, the dissolved form is more available and more toxic to aquatic life than filterable forms. Site-specific translators can be developed to account for site-specific conditions, thereby preventing exceedingly stringent or under protective water quality objectives.

For deep-water discharges to San Pablo Bay (Discharge Point No. 001), Regional Water Board staff used translators for copper and nickel based on Table 7.2-2 of the Basin Plan and recommendations of the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). These translators are summarized in the table below:

Table F-18. Translators for Copper and Nickel for Deepwater Discharges North of Dumbarton Bridge

	Copper	Nickel
AMEL Translator	0.38	0.27
MDEL Translator	0.66	0.57

In determining the need for and calculating WQBELs for all other metals, Regional Water Board staff used default translators from 40 CFR 131.38(b)(2), Table 2.

3. Determining the Need for WQBELs

40 CFR 122.44(d)(1)(i) requires permits to include WQBELs for all pollutants (non-priority or priority) "which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any narrative or numeric criteria within a State water quality standard" (i.e., which have "Reasonable Potential"). Assessing whether a pollutant has Reasonable Potential is the fundamental step in determining whether or not a WQBEL is required.

a. Reasonable Potential Analysis

Regional Water Board staff used the methods and procedures prescribed in SIP section 1.3 to analyze the effluent and background data and the nature of facility operations to determine if the discharge has Reasonable Potential. The Reasonable Potential Analysis (RPA) compares the effluent data with numeric and narrative WQOs in the Basin Plan, NTR, and CTR.

b. Reasonable Potential Methodology

The RPA projects a maximum effluent concentration (MEC) for each pollutant based on existing data, while accounting for a limited data set and effluent variability. There are three triggers in determining Reasonable Potential.

i. The first trigger is activated if the MEC is greater than the lowest applicable WQO (MEC $\geq$ WQO), which has been adjusted, if appropriate, for pH, hardness, and translator data. If the MEC is greater than the adjusted WQO, then that pollutant has Reasonable Potential, and a WQBEL is required.

ii. The second trigger is activated if the observed maximum ambient background concentration (B) is greater than the adjusted WQO (B > WQO) and the pollutant is detected in any of the effluent samples.

iii. The third trigger is activated if a review of other information determines that a WQBEL is required to protect beneficial uses, even though both MEC and B are less than the WQO. A limitation may be required under certain circumstances to protect beneficial uses.

c. Effluent Data

The RPA was based on the effluent monitoring data collected by the Discharger from July 2006 through August 2010 for most pollutants. Regional Water Board staff analyzed these data and the nature of the discharge to determine if the discharge has Reasonable Potential.

d. Ambient Background Data

Ambient background values are used in the RPA and in the calculation of effluent limitations. For the RPA, ambient background concentrations are the observed maximum detected water column concentrations. The SIP states that for calculating WQBELs, ambient background concentrations are either the observed maximum ambient water column concentrations or, for objectives intended to protect human health from carcinogenic effects, the arithmetic mean of observed ambient water concentrations. The RMP station at Yerba Buena Island, located in the Central Bay, has been monitored for most of the inorganic (CTR constituent numbers 1–15) and some of the organic (CTR constituent numbers 16–126) toxic pollutants, and these data were used as background data in performing this RPA.

The RMP has not analyzed all the constituents listed in the CTR. On May 15, 2003, a group of several San Francisco Bay Region dischargers (known as the Bay Area Clean Water Agencies, or BACWA) submitted a collaborative receiving water study, entitled the *San Francisco Bay Ambient Water Monitoring Interim Report*. This study includes monitoring results from sampling events in 2002 and 2003 for the remaining priority pollutants not monitored by the RMP. The RPA was conducted and the WQBELs were calculated using RMP data from 1993 through 2008 for inorganics and organics at the Yerba Buena Island RMP station, and additional data from the BACWA *Ambient Water Monitoring: Final CTR Sampling Update Report* for the Yerba Buena Island RMP station.

e. RPA Determination

The MECs, most stringent applicable WQOs, and background concentrations used in the RPA are presented in Table F-19, along with the RPA results (yes or no) for each pollutant analyzed. Reasonable Potential was not determined for all pollutants because there are not applicable water quality objectives for all pollutants, and monitoring data were not available for others. The pollutants that exhibit Reasonable Potential for Discharge Point No. 001 are copper, lead, selenium, cyanide, dioxin-TEQ, and ammonia.

Table F-19. Summary of RPA Results – Discharge Point No. 001

CTR #	Priority Pollutants	MEC or Minimum DL [1],[2] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [1],[2] (µg/L)	RPA Results [3]
1	Antimony	1.4	4,300	1.8	No
2	Arsenic	18.26	36	2.46	No
3	Beryllium	0.07	No Criteria	0.215	Ud
4	Cadmium	0.2	1.1	0.13	No
5a	Chromium (III)	Not Available	201	4.4	--
5b	Hexavalent Chromium	8.03	11	4.4	No
6	Copper	6.2	14.2	2.549	Yes[4]
7	Lead	1.7	1.6	0.804	Yes
8	Mercury (303d listed)	0.070	0.025	0.0086	[5]
9	Nickel (303d listed)	27	30	3.73	No
10	Selenium (303d listed)	46.95	5	0.39	Yes
11	Silver	0.19	2.2	0.052	No
12	Thallium	0.05	6.3	0.21	No
13	Zinc	38	86	5.092	No
14	Cyanide	21	2.9	<0.4	Yes
15	Asbestos	Not Available	No Criteria	Not Available	Ud
16	2,3,7,8-TCDD (303d listed)	$<1.4x10^{-7}$	$1.4x10^{-8}$	$8.2x10^{-9}$	No
	Dioxin TEQ (303d listed)	$4.56x10^{-8}$	$1.4x10^{-8}$	$5.3x10^{-8}$	Yes
17	Acrolein	<0.5	780	<0.5	No
18	Acrylonitrile	<0.58	0.66	0.03	No
19	Benzene	<0.03	71	<0.05	No
20	Bromoform	<0.03	360	<0.5	No
21	Carbon Tetrachloride	<0.04	4.4	0.06	No
22	Chlorobenzene	<0.03	21,000	<0.5	No
23	Chlorodibromomethane	<0.03	34	<0.05	No
24	Chloroethane	<0.03	No Criteria	<0.5	Ud
25	2-Chloroethylvinyl ether	<0.1	No Criteria	<0.5	Ud
26	Chloroform	3.4	No Criteria	<0.5	Ud
27	Dichlorobromomethane	<0.04	46	<0.05	No
28	1,1-Dichloroethane	<0.04	No Criteria	<0.05	Ud
29	1,2-Dichloroethane	<0.04	99	0.04	No
30	1,1-Dichloroethylene	<0.07	3.2	<0.5	No
31	1,2-Dichloropropane	<0.03	39	<0.05	No
32	1,3-Dichloropropylene	<0.03	1,700	<0.5	No
33	Ethylbenzene	<0.04	29,000	<0.5	No
34	Methyl Bromide	<0.06	4,000	<0.5	No
35	Methyl Chloride	<0.06	No Criteria	<0.5	Ud
36	Methylene Chloride	<0.08	1,600	22	No
37	1,1,2,2-Tetrachloroethane	<0.04	11	<0.05	No
38	Tetrachloroethylene	0.5	8.85	<0.05	No
39	Toluene	<0.06	200,000	<0.3	No
40	1,2-Trans-Dichloroethylene	<0.06	140,000	<0.5	No
41	1,1,1-Trichloroethane	<0.03	No Criteria	<0.5	Ud
42	1,1,2-Trichloroethane	<0.05	42	<0.05	No
43	Trichloroethylene	<0.05	81	<0.5	No
44	Vinyl Chloride	<0.06	525	<0.5	No
45	2-Chlorophenol	<0.7	400	<1.2	No
46	2,4-Dichlorophenol	<0.7	790	<1.3	No
47	2,4-Dimethylphenol	<0.8	2,300	<1.3	No
48	2-Methyl- 4,6-	<0.6	765	<1.2	No

CTR #	Priority Pollutants	MEC or Minimum DL [1],[2] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [1],[2] (µg/L)	RPA Results [3]
	Dinitrophenol				
49	2,4-Dinitrophenol	<0.6	14,000	<0.7	No
50	2-Nitrophenol	<0.6	No Criteria	<1.3	Ud
51	4-Nitrophenol	<0.6	No Criteria	<1.6	Ud
52	3-Methyl 4-Chlorophenol	<0.6	No Criteria	<1.1	Ud
53	Pentachlorophenol	<0.6	7.9	<1	No
54	Phenol	Not Available	4600000	<1.3	--
55	2,4,6-Trichlorophenol	<0.6	6.5	<1.3	No
56	Acenaphthene	<0.03	2,700	0.00193	No
57	Acenaphthylene	<0.02	No Criteria	0.001285	Ud
58	Anthracene	<0.02	110,000	0.000592	No
59	Benzidine	<1	0.00054	<0.0015	No
60	Benzo(a)Anthracene	<0.02	0.049	0.005315	No
61	Benzo(a)Pyrene	<0.02	0.049	0.00333	No
62	Benzo(b)Fluoranthene	<0.02	0.049	0.00459	No
63	Benzo(ghi)Perylene	0.03	No Criteria	0.004544	Ud
64	Benzo(k)Fluoranthene	<0.02	0.049	0.00177	No
65	Bis(2-Chloroethoxy)Methane	<0.7	No Criteria	<0.3	Ud
66	Bis(2-Chloroethyl)Ether	<0.8	1.4	<0.0002	No
67	Bis(2-Chloroisopropyl)Ether	<0.6	170,000	Not Available	No
68	Bis(2-Ethylhexyl)Phthalate	1.7	5.9	<0.7	No
69	4-Bromophenyl Phenyl Ether	<0.8	No Criteria	<0.23	Ud
70	Butylbenzyl Phthalate	1.5	5,200	0.0056	No
71	2-Chloronaphthalene	<0.9	4,300	<0.3	No
72	4-Chlorophenyl Phenyl Ether	<0.9	No Criteria	<0.3	Ud
73	Chrysene	<0.02	0.049	0.002781	No
74	Dibenzo(a,h)Anthracene	<0.02	0.049	0.00064	No
75	1,2-Dichlorobenzene	<0.03	17,000	<0.3	No
76	1,3-Dichlorobenzene	<0.18	2,600	<0.3	No
77	1,4-Dichlorobenzene	<0.04	2,600	<0.3	No
78	3,3 Dichlorobenzidine	<0.6	0.077	<0.001	No
79	Diethyl Phthalate	<0.6	120,000	<0.21	No
80	Dimethyl Phthalate	<0.7	2,900,000	<0.21	No
81	Di-n-Butyl Phthalate	0.9	12,000	0.016	No
82	2,4-Dinitrotoluene	<0.6	9.1	<0.27	No
83	2,6-Dinitrotoluene	<0.6	No Criteria	<0.29	Ud
84	Di-n-Octyl Phthalate	<0.7	No Criteria	<0.38	Ud
85	1,2-Diphenylhydrazine	<0.6	0.54	0.0037	No
86	Fluoranthene	0.11	370	0.0109	No
87	Fluorene	<0.02	14,000	0.00208	No
88	Hexachlorobenzene	<0.7	0.00077	0.0000221	No
89	Hexachlorobutadiene	<0.7	50	<0.3	No
90	Hexachlorocyclopentadiene	<0.8	17,000	<0.3	No
91	Hexachloroethane	<0.6	8.9	<0.2	No
92	Indeno(1,2,3-cd)Pyrene	<0.02	0.049	0.00398	No
93	Isophorone	<0.7	600	<0.3	No
94	Naphthalene	<0.02	No Criteria	0.01262	Ud

CTR #	Priority Pollutants	MEC or Minimum DL [1],[2] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [1],[2] (µg/L)	RPA Results [3]
95	Nitrobenzene	<0.7	1,900	<0.25	No
96	N-Nitrosodimethylamine	<0.8	8.1	<0.3	No
97	N-Nitrosodi-n-Propylamine	<0.6	1.4	<0.001	No
98	N-Nitrosodiphenylamine	<0.6	16	<0.001	No
99	Phenanthrene	0.06	No Criteria	0.00951	Ud
100	Pyrene	0.09	11,000	0.0194	No
101	1,2,4-Trichlorobenzene	<0.8	No Criteria	<0.3	Ud
102	Aldrin	<0.002	0.00014	0.00000285	No
103	Alpha-BHC	<0.002	0.013	0.000496	No
104	beta-BHC	<0.002	0.046	0.000413	No
105	gamma-BHC	<0.002	0.063	0.000703	No
106	delta-BHC	<0.002	No Criteria	0.000053	Ud
107	Chlordane (303d listed)	<0.005	0.00059	0.000178	No
108	4,4'-DDT (303d listed)	<0.003	0.00059	0.000167	No
109	4,4'-DDE (linked to DDT)	<0.003	0.00059	0.000693	No
110	4,4'-DDD	<0.003	0.00084	0.000313	No
111	Dieldrin (303d listed)	<0.002	0.00014	0.000264	No
112	Alpha-Endosulfan	<0.003	0.0087	0.000031	No
113	beta-Endolsulfan	<0.003	0.0087	0.000069	No
114	Endosulfan Sulfate	<0.002	240	0.0000819	No
115	Endrin	<0.002	0.0023	0.00004	No
116	Endrin Aldehyde	<0.002	0.81	Not Available	No
117	Heptachlor	<0.003	0.00021	0.000019	No
118	Heptachlor Epoxide	<0.002	0.00011	0.000094	No
119-125	PCBs sum (303d listed[6])	<0.02	0.00017	0.00146	[5]
126	Toxaphene	<0.19	0.0002	Not Available	No
	Tributyltin	<0.00019	0.0074	0.00222	No
	Total PAHs	0.54	15	0.0841	No
	Total Ammonia (mg/L)	3.3	1.27	0.2	Yes

[1] The MEC or maximum background concentration is the actual detected concentration unless there is a "<" sign before it, in which case the value shown is the minimum detection level.

[2] The MEC or maximum background concentration is "Not Available" when there are no monitoring data for the constituent.

[3] RPA Results =Yes, if MEC => WQO/WQC, or B > WQO/WQC and MEC is detected;

= No, if MEC and B are < WQO/WQC or all effluent data are undetected;

= Undetermined (Ud), if no criteria have been promulgated;

= Cannot Determine, if there are insufficient data.

[4] Section 7.2.1.2 of the Basin Plan requires that individual NPDES permits for municipal and industrial wastewater treatment facilities include WQBELs for copper.

[5] SIP section 1.3 excludes from its RPA procedure priority pollutants for which a TMDL has been developed. TMDLs have been developed for mercury and PCBs in San Francisco Bay. Mercury and PCBs from wastewater discharges are regulated by NPDES Permit No. CA0038849 (currently Regional Water Board Order No. R2-2007-0077 as amended by Order No. R2-2011-0012), which implements the San Francisco Bay Mercury and PCB TMDLs.

i. **Constituents with limited data.** The Discharger has performed sampling and analysis for the constituents listed in the CTR. This data set was used to perform the RPA. In some cases, Reasonable Potential cannot be determined because effluent data are limited or ambient background concentrations are not available. The Discharger will continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available,

further RPA will be conducted to determine whether to add numeric effluent limitations to this Order or to continue monitoring.

ii. **Pollutants with no Reasonable Potential.** WQBELs are not included in this Order for constituents that do not demonstrate Reasonable Potential; however, monitoring for such pollutants is still required. If concentrations of these constituents are found to have increased significantly, section VI.C.2.a of this Order requires the Discharger to investigate the source of the increase. Remedial measures are required if the increase poses a threat to water quality.

f. RPA Determination for Sediment Quality Objectives

Pollutants in some receiving water sediments may be present in quantities that, alone or in combination, are toxic to benthic communities. Efforts are underway to identify stressors causing such conditions. However, to date there is no evidence directly linking compromised sediment conditions to the discharges subject to this Order; therefore, the Regional Water Board cannot draw a conclusion about reasonable potential for the discharges to cause or contribute to exceedances of the sediment quality objectives. Nevertheless, the Discharger continues to participate in the RMP, which monitors San Francisco Bay sediment and seeks to identify stressors responsible for degraded sediment quality. Thus far, the monitoring has provided only limited information about potential stressors and sediment transport. The Regional Water Board is exploring appropriate requirements to impose on the Discharger, along with other dischargers in the region, to obtain additional information that may inform future RPAs.

4. WQBEL Calculations

a. Pollutants with Reasonable Potential

WQBELs were developed for the toxic and priority pollutants that were determined to have Reasonable Potential. The WQBELs were calculated based on appropriate WQOs and the appropriate procedures specified in SIP section 1.4. The WQOs used for each pollutant with Reasonable Potential are discussed below.

b. Dilution Credit

The SIP provides the basis for any dilution credit. Based on a study entitled *In-Situ Measurement of Dilution of Chevron Effluent in San Pablo Bay*, dated November 1987, and prepared by CH2M Hill, the Discharger indicates that the diffuser achieves a field-verified minimum initial dilution of 200:1, and a modeled initial dilution (based on conservative assumptions) of at least 34:1.

Based on RMP monitoring data for San Pablo Bay, there is variability in the receiving water, and the hydrology of the receiving water is very complex. Therefore, it is uncertain how representative the ambient background data used to determine the effluent limitations is. Pursuant to SIP section 1.4.2.1, “dilution credit may be limited or denied on a pollutant-by-pollutant basis….” The detailed basis for each pollutant is explained below.

i. Bioaccumulative Pollutants: For certain bioaccumulative pollutants, dilution credit is significantly restricted or denied. This determination is based on available data on concentrations of these pollutants in aquatic organisms, sediment, and the water column. Selenium, chlordane, DDT, dieldrin, dioxin and furan compounds, dioxin-like PCBs, mercury, and PCBs appear on the CWA section 303(d) list for San Pablo Bay because they impair San Pablo Bay's beneficial uses. The following factors suggest insufficient assimilative capacity in San Pablo Bay for these pollutants.

(a) Bioaccumulative Pollutants Excluding Selenium

Tissue samples taken from fish in San Pablo Bay show the presence of these pollutants at concentrations greater than screening levels (*Contaminant Concentrations in Fish from San Francisco Bay*, San Francisco Estuary Institute, May 1997). The results of the 1994 San Francisco Bay pilot study, presented in *Contaminated Levels in Fish Tissue from San Francisco Bay* (Regional Water Board, 1994) also showed elevated levels of chemical contaminants in fish tissues. The Office of Environmental Health and Hazard Assessment completed a preliminary review of the data in the 1994 report and subsequently issued an interim consumption advisory covering certain fish species in San Francisco Bay due to the levels of some of these pollutants, including dioxins and pesticides (e.g., DDT). This advisory is still in effect. Therefore, dilution credits are denied for bioaccumulative pollutants on the 303(d) list for which there is lack of data on sources and significant uncertainty about how different sources of these pollutants contribute to bioaccumulation.

(b) Selenium

For selenium, San Francisco Bay waterfowl tissue data presented in the State Water Board and California Department of Fish and Game's *Selenium Verification Study*, 1988-1990 (Document 91-2-WQ, May 1991) showed elevated selenium levels in the livers of waterfowl that feed on bottom-dwelling organisms, such as clams. In addition, the Office of Environmental Health and Hazard Assessment issued an advisory in 1987 for consumption of two species of North Bay diving ducks found to have high tissue levels of selenium. This advisory is still in effect. Elevated selenium levels have also been found in the tissue of white sturgeon, which also feed on clams.

This information, together with high uncertainty regarding how different sources of selenium contribute to bioaccumulation, has previously led the Regional Water Board to deny dilution credit for selenium. However, refineries have significantly reduced their discharges of selenium, and altered the chemical forms of the selenium they discharge so the selenium is generally less bioavailable. Also, substantially more information has become available to advance the development of a selenium TMDL for north San Francisco Bay segments. Recent work reduces some uncertainties regarding selenium sources, fate, and transport, and suggests that some assimilative capacity remains in the receiving waters. Based on this preliminary information, Regional Water Board staff concludes that limited dilution credit for selenium may be granted such that existing refinery performance is maintained, pending the completion of a selenium TMDL. This Order grants limited

dilution credits for selenium, but only to a level that maintains existing refinery performance. When a selenium TMDL is completed, the Regional Water Board will amend these limits to be consistent with TMDL wasteload allocations. Granting dilution credits for selenium at this time is appropriate specifically because of the substantial new information about selenium in San Francisco Bay now available. This information does not apply to other pollutants. Therefore, this Order uses a dilution credit of D = 7 (8:1 dilution) to calculate selenium WQBELs. Using this dilution will maintain existing performance, because it is the same dilution granted in the previous permit, as amended by Order No. R2-2010-0057.

ii. Non-bioaccumlative Pollutants: SIP section 1.4.2 allows for limiting the dilution credit. For most non-bioaccumulative pollutants, dilution credit is restricted.

(a) Non-Bioaccumlative Pollutants, Excluding Ammonia

For non-bioaccumulative pollutants (except ammonia), a conservative dilution credit of 10:1 (D = 9) has been assigned for Discharge Point 001 to address uncertainties with mixing. The 10:1 dilution credit is consistent with the previous permit and is also based, in part, on Basin Plan Prohibition 1 (Basin Plan Table 4-1), which prohibits discharges with less than 10:1 dilution.

Based on RMP monitoring data for San Francisco Bay, there is variability in the receiving water, and the hydrology of the receiving water is very complex. Therefore, it is uncertain how representative the ambient background data used to determine the effluent limitations is. Models used to predict dilution have not considered the three dimensional nature of San Francisco Bay currents resulting from the interaction of tidal flushes and seasonal fresh water outflows. Being heavier and colder than fresh water, ocean salt water enters San Francisco Bay on twice-daily tidal cycles, generally beneath the warmer fresh water that flows seaward. When these waters mix and interact, complex circulation patterns occur due to the varying densities of the fresh and ocean waters. The complex patterns occur throughout San Francisco Bay, but are most prevalent in the San Pablo Bay, Carquinez Straight, and Suisun Bay areas. The locations of this mixing and interaction change, depending on the strength of each tide. Additionally, sediment loads from the Central Valley change on a long-term basis, affecting the depth of different parts of San Francisco Bay, resulting in alteration of flow patterns, mixing, and dilution at the outfall.

(b) Ammonia

For ammonia, a non-persistent pollutant, a conservative estimate of actual initial dilution was used to calculate the effluent limitations for Discharge Point 001. This is justified because ammonia quickly disperses and degrades to a non-toxic state, and cumulative toxicity effects are unlikely. As described above, the 1987 field dye tracer studies found an initial dilution of 200:1 and initial dilution modeling estimated an actual initial dilution ratio of at least 34:1 (D = 33). For this Order, the 34:1 dilution ratio was used for calculating WQBELs based on both the acute and chronic objectives. To ensure that the 1987 study and modeling results are still

valid, this Order requires the Discharger to update the study and modeling (see Provision VI.C.2.d of this Order).

c. Calculation of Pollutant-Specific WQBELs - Discharge Point No. 001

i. Copper

(a) *Copper WQOs*. The most stringent applicable WQOs for copper are the Basin Plan's site-specific chronic and acute marine WQOs, 6.0 and 9.4 micrograms per liter (µg/L), respectively, expressed as dissolved metal. Regional Water Board staff converted these WQOs to total recoverable metal using site-specific translators of 0.38 (chronic) and 0.67 (acute). This results in a chronic water quality criterion of 16 µg/L and an acute water quality criterion of 14 µg/L.

(b) *RPA Results*. Even though the MEC for copper of 6.2 µg/L is below the most stringent applicable WQO for this pollutant, this Order establishes effluent limitations. This is because Section 7.2.1.2 of the Basin Plan requires that individual NPDES permits for municipal and industrial wastewater treatment facilities include WQBELs for copper.

(c) C*opper WQBELs*. WQBELs for copper calculated according to SIP procedures using a coefficient of variation (CV) of 0.25 and a dilution credit of D = 9 are an AMEL of 84 µg/L and an MDEL of 120 µg/L. The previous permit contained more stringent limits of an AMEL of 13 µg/L and an MDEL of 25 µg/L.

(d) *Anti-backsliding*. This Order satisfies anti-backsliding requirements because San Francisco Bay is in attainment for copper and, consistent with Section 303(d)(4)(B), the Regional Water Board completed an Antidegradation Analysis for copper when it developed site-specific objectives.

ii. Selenium

(a) *Selenium WQC.* The most stringent applicable WQC for selenium are from the NTR for protection of aquatic life. The NTR establishes a saltwater and freshwater acute criterion of 20 µg/L and chronic criterion of 5.0 µg/L.

(b) *RPA Results.* This Order establishes effluent limitations for selenium because the MEC of 47 µg/L exceeds the most stringent applicable WQC for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *Selenium WQBELs.* Based on a dilution credit of 8:1 (D=7), WQBELs for selenium calculated according to SIP procedure using a CV of 0.36 are an AMEL of 33µg/L and an MDEL of 53 µg/L. The previous permit as amended by Order No. R2-2010-0057 (*Amendment of Waste Discharge Requirements for San Francisco Bay Region Refineries*) contained more stringent limits of an AMEL of 33 µg/L and an MDEL of 34 µg/L.

(d) *Anti-backsliding.* This Order retains the more stringent WQBELs from the previous permit, thereby satisfying anti-backsliding requirements.

iii. Lead

(a) *Lead WQOs.* The most stringent applicable WQOs for lead are the Basin Plan's freshwater acute and chronic objectives for protection of aquatic life of 42 µg/L and 1.6 µg/L, as calculated using the receiving water hardness value of 59 mg/L, as $CaCO_3$.

(b) *RPA Results.* This Order establishes effluent limitations for lead because the MEC of 1.7 µg/L exceeds the most stringent applicable WQO for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *Lead WQBELs.* WQBELs for lead calculated according to SIP procedure using a CV of 0.77 and a dilution credit of D = 9 are an AMEL of 7.0 ug/L and an MDEL of 16 ug/L. The previous permit contained a less stringent limit AMEL of 7.4 µg/L, but a more stringent MDEL of 15 µg/L. This order includes the newly calculated AMEL of 7.0 µg/L and MDEL of 16 µg/L. As a pair, these limits are more stringent than those included in the previous permit. This is because the newly calculated pair of limits should hold the Discharger to a long-term average discharge of 4.1 µg/L compared with 4.7 µg/L under the previous permit.

(d) *Anti-backsliding.* This Order includes more stringent effluent limits than the previous permit, thereby satisfying anti-backsliding requirements.

iv. Cyanide

(a) *Cyanide WQO.* The most stringent applicable WQOs for cyanide are the Basin Plan's site-specific chronic and acute marine WQOs, 2.9 and 9.4 micrograms per liter (µg/L), respectively.

(b) *RPA Results.* This Order establishes effluent limitations for cyanide because the MEC of 21 µg/L exceeds the most stringent applicable WQO for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *Cyanide WQBELs.* Order No. R2-2006-0035 established conditional effluent limitations for cyanide if a SSO for cyanide for all segments of the San Francisco Bay became legally effective. On August 8, 2008, the Regional Water Board sent a letter to the Discharger informing the Discharger that on July 22, 2008, the USEPA approved the cyanide SSO, and the conditional cyanide effluent limitations of an AMEL of 22 µg/L and a MDEL of 38 µg/L were effective.

For this permit reissuance, WQBELs for cyanide were recalculated according to SIP procedure using a CV of 0.87 and a dilution credit of D = 9. The resulting WQBELs were an AMEL of 19 µg/L and an MDEL of 45 µg/L. This order includes the newly calculated AMEL of 19 µg/L and MDEL of 45 µg/L. As a pair, these limits are more stringent than those included in the previous permit. This is because the newly calculated pair of limits should hold the Discharger to a long-term average discharge of 10.5 µg/L compared with 15.6 µg/L under the previous permit.

(d) *Anti-backsliding.* This Order includes more stringent effluent limits than the previous permit, thereby satisfying anti-backsliding requirements

v. Dioxin-TEQ

(a) *Dioxin-TEQ WQO*. The Basin Plan narrative WQO for bioaccumulative substances states:

> *Many pollutants can accumulate on particulates, in sediments, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.*

Because the consensus of the scientific community is that dioxins and furans associate with particulates, accumulate in sediments, and bioaccumulate in the fatty tissues of fish and other organisms, the Basin Plan's narrative bioaccumulation WQO applies to these pollutants. Elevated levels of dioxins and furans in San Francisco Bay fish tissue demonstrate that the narrative bioaccumulation WQO is not being met. USEPA has therefore included San Francisco Bay as impaired by dioxins and furans in the current CWA section 303(d) listing of receiving waters where WQOs are not being met after imposition of technology-based requirements.

The CTR establishes a numeric WQO for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD) of 1.4×10^{-8} µg/L to protect human health when aquatic organisms are consumed. When the CTR was promulgated, USEPA stated its support of the regulation of other dioxin and dioxin-like compounds through the use of toxicity equivalencies (TEQs) in NPDES permits. USEPA stated specifically, "For California waters, if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric WQBELs for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme" [65 Fed. Reg. 31682, 31695 (2000)].

This Order uses a TEQ scheme based on a set of toxicity equivalency factors (TEFs) the World Health Organization (WHO) developed in 1998, and a set of bioaccumulation equivalency factors (BEFs) USEPA developed for the Great Lakes region (40 CFR 132, Appendix F), to convert the concentration of any congener of dioxin or furan into an equivalent concentration of 2,3,7,8-TCDD. The CTR criterion is used as a criterion for dioxin-TEQ because dioxin-TEQ represents a toxicity-weighted concentration equivalent to 2,3,7,8-TCDD, thus translating the narrative bioaccumulation objective into a numeric criterion appropriate for the RPA.

To determine if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of the Basin Plan's narrative bioaccumulation WQO, TEFs and BEFs were used to express the measured concentrations of 16 dioxin congeners in effluent and background samples as 2,3,7,8-TCDD. These "equivalent" concentrations were then compared to the CTR

numeric criterion for 2,3,7,8-TCDD (1.4 x 10^{-8} µg/L). Although the 1998 WHO scheme includes TEFs for dioxin-like PCBs, they are not included in this Order's TEQ scheme. The CTR has established a specific water quality standard for PCBs, and dioxin-like PCBs are included in the analysis of total PCBs.

(b) *RPA Results*. To determine if Reasonable Potential exists for dioxin or dioxin-like compounds in this discharge, Regional Water Board staff used TEFs and BEFs to express the measured concentrations of 16 dioxin congeners in effluent and background samples as 2,3,7,8-TCDD. These "equivalent" concentrations were then compared to the CTR numeric criterion for 2,3,7,8-TCDD (1.4 x 10^{-8} µg/L).

This Order establishes effluent limitations for dioxin-TEQ because the MEC (4.56 x 10^{-8} µg/L) exceeds the WQO for dioxin-TEQ translated from the bioaccumulation objective (1.4 x 10^{-8} µg/L), demonstrating Reasonable Potential by Trigger 1.

(c) *WQBELs*. WQBELs for dioxin–TEQ calculated using SIP procedures as guidance, with a CV of 0.6 and no dilution credit, are an AMEL of 1.4 x 10^{-8} µg/L and an MDEL of 2.8 x 10^{-8} µg/L. The previous Order included an interim limitation for dioxin-TEQ of 1.0 x 10^{-7} µg/L (effective until June 30, 2011 or until TMDL wasteload allocations are established and adopted by the Regional Water Board) and no final limitations.

(d) *Anti-backsliding*. Anti-backsliding requirements are satisfied because the previous Order did not contain a final limit for dioxin-TEQ.

vi. Ammonia

(a) *Ammonia WQO*. The Basin Plan contains WQOs for un-ionized ammonia of 0.025 mg/L as an annual median and 0.16 mg/L as a maximum upstream of the San Francisco Bay Bridge. Regional Water Board staff translated these WQOs from un-ionized ammonia concentrations to equivalent total ammonia concentrations (as nitrogen) since (1) sampling and laboratory methods are not available to analyze for un-ionized ammonia; and (2) the fraction of total ammonia that exists in the toxic un-ionized form depends on the pH, salinity, and temperature of the receiving water. To translate the Basin Plan un-ionized ammonia objective, Regional Water Board staff used pH, salinity, and temperature data from 1993 through 2001 from the Yerba Buena Island RMP Station (BC10). Regional Water Board staff used the following equations to determine the fraction of total ammonia that would exist in the toxic un-ionized form in the estuarine receiving water where the various measurements were taken from 1993-2001 (USEPA, 1989, Ambient Water Quality Criteria for Ammonia (Saltwater)–1989, EPA Publication 440/5-88-004):

For salinity > 10 ppt: fraction of NH_3 = $\frac{1}{1+10^{(pK-pH)}}$

Where:

$$pK = 9.245 + 0.116(I) + 0.0324(298 - T) + \frac{0.0415(P)}{(T)}$$

$$I = \text{Molal ionic strength of saltwater} = \frac{19.9273(S)}{(1{,}000 - 1.005109[S])}$$

S = Salinity (parts per thousand)

T = Temperature in degrees Kelvin

P = Pressure (one atmosphere)

Regional Water Board staff then used the 90th percentile and median un-ionized ammonia fractions from 1993 to 2001 to express the acute and chronic un-ionized ammonia WQOs as total ammonia concentrations. This approach is consistent with USEPA guidance on translating dissolved metal WQOs to total recoverable metal WQOs (USEPA, 1996, *The Metals Translator: Guidance for Calculating a Total Recoverable Limit from a Dissolved Criterion,* EPA Publication 823-B-96-007).

The equivalent total ammonia acute and chronic WQOs are 4.93 mg/L and 1.27 mg/L, respectively.

(b) *RPA Results.* Basin Plan section 4.5.5.2 indicates that WQBELs shall be calculated according to the SIP. Basin Plan section 3.3.20 refers to ammonia as a toxic pollutant. Therefore, The SIP methodology was used to perform the RPA and to calculate effluent limitations for ammonia. This Order establishes effluent limitations for total ammonia because the MEC of 3.3 mg/L as nitrogen exceeds the most stringent applicable translated WQO for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *WQBELs.* The total ammonia WQBELs calculated according to SIP procedures using a CV of 1.9 and a dilution of D = 33 are an MDEL of 150 mg/L as N and an AMEL of 51 mg/L as N. Regional Water Board staff made statistical adjustments to the WQBEL calculations because:

- the Basin Plan's chronic WQO for un-ionized ammonia is based on an annual median instead of the typical 4-day average;
- the SIP assumes a 4-day average concentration and monthly sampling frequency of 4 days per month to calculate effluent limitations based on chronic criteria, whereas a 365-day average and a monitoring frequency of 30 days per month, reflecting the actual basis of the WQO and actual sampling frequency, were used here.

These statistical adjustments are supported by USEPA's *Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia,* published on December 22, 1999, in the Federal Register.

Following SIP methodology, Regional Water Board staff used the maximum ambient background total ammonia concentration to calculate effluent limitations based on the acute criterion; and the median background total ammonia

concentration to calculate effluent limitations based on the chronic criterion. Because the Basin Plan's chronic un-ionized ammonia objective is an annual median, the median background concentration is more representative of ambient conditions than a daily maximum.

Effluent Limitations for Total Ammonia (as N)		
	AMEL	**MDEL**
Based on Basin Plan	51 mg/L	150 mg/L

(d) *Anti-backsliding.* Anti-backsliding requirements are satisfied because the previous Order did not include total ammonia WQBELs.

d. Effluent Limitation Calculations – Discharge Point No. 001

Table F-20 below summarizes the effluent limitation calculations for Discharge Point No. 001.

Table F-20. Effluent Limitation Calculations for Discharge Point No. 001

PRIORITY POLLUTANTS	**Selenium (303d listed)**	**Copper**	**Lead**	**Cyanide**	**Dioxin-TEQ (303d listed)**	**Total Ammonia (acute)**	**Total Ammonia (chronic)**
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L N**	**mg/L N**
Basis and Criteria type	CTR Aquatic Life	Basin Plan SSO	CTR Aquatic Life	CTR Aquatic Life	CTR HH	Basin Plan Aquatic Life	Basin Plan Aquatic Life
Criteria -Acute	20	-----	42	-----	-----	4.93	-----
Criteria -Chronic	5.0	-----	1.6	-----	-----	-----	1.27
SSO Criteria –Acute	-----	3.9	-----	9.4	-----	-----	-----
SSO Criteria -Chronic	-----	2.5	-----	2.9	-----	-----	-----
Water Effects ratio (WER)	1	2.4	1	1	1	1	1
Lowest WQO	5.0	14.2	1.6	2.9	1.4E-08	4.93	1.27
Site Specific Translator - MDEL	-----	0.66	-----	-----	-----	-----	-----
Site Specific Translator - AMEL	-----	0.38	-----	-----	-----	-----	-----
Dilution Factor (D) (if applicable)	7	9	9	9	0	33	33
No. of samples per month	4	4	4	4	4	4	30
Aquatic life criteria analysis required? (Y/N)	Y	Y	Y	Y	N	Y	Y
HH criteria analysis required? (Y/N)	N	N	N	Y	Y	N	N
Applicable Acute WQO	20	14	42	9.4	-----	4.93	
Applicable Chronic WQO	5	15.8	1.6	2.9	-----		1.27
HH criteria	-----	-----	-----	2.2E+05	1.40E-08	-----	-----
Background (Maximum Conc for Aquatic Life calc)	0.39	2.55	0.8	0.4	8.20E-09	0.43	0.13

PRIORITY POLLUTANTS	Selenium (303d listed)	Copper	Lead	Cyanide	Dioxin-TEQ (303d listed)	Total Ammonia (acute)	Total Ammonia (chronic)
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L N**	**mg/L N**
Background (Average Conc for Human Health calc)	-----	-----	-----	0.00	5.00E-08	-----	-----
Is the pollutant on the 303d list and/or bioaccumulative (Y/N)?	Y	N	N	N	Y	N	N
ECA acute	157.3	118.9	409.8	90.4	-----	153	-----
ECA chronic	37.3	135	9.0	25.4	-----	-----	38.9
ECA HH				2.2E+06	1.40E-08		
No. of data points <10 or at least 80 percent of data reported non detect? (Y/N)	N	N	N	N	Y	N	N
Avg of effluent data points	13	3.6	0.6	3.9	---	0.39	0.39
Std Dev of effluent data points	4.5	0.91	0.46	3.4	---	0.73	0.73
CV calculated	0.36	0.25	0.77	0.87	0.6	1.9	1.9
CV (Selected) - Final	0.36	0.25	0.77	0.87	0.6	1.9	1.9
ECA acute mult99	0.48	0.58	0.26	0.23	-----	0.12	-----
ECA chronic mult99	0.67	0.75	0.45	0.42	-----	-----	0.80
LTA acute	75	69	106	21.0	-----	18.8	-----
LTA chronic	25	101	4.1	10.5	-----	-----	31.2
minimum of LTAs	25	69	4.1	10.5	-----	18.8	31.2
AMEL mult95	1.3	1.2	1.7	1.8	3.7	2.7	1.6
MDEL mult99	2.1	1.7	3.9	4.3	13	8.2	8.2
AMEL (aq life)	33	84	7.0	19	-----	51	51
MDEL(aq life)	53	120	16	45	-----	150	250
MDEL/AMEL Multiplier	1.6	1.4	2.3	2.4	3.4	3.0	3.0
AMEL (human hlth)	-----	-----	-----	2.2.E+06	1.4.E-08	-----	-----
MDEL (human hlth)	-----	-----	-----	5.2.E+06	2.8.E-08	-----	-----
minimum of AMEL for Aq. life vs HH	33	84	7.0	19	1.4E-08	51	51
minimum of MDEL for Aq. Life vs HH	53	120	16	45	2.8E-08	150	250
Current limit in permit (30-day average)	33	13	7.4	22	-----	-----	-----
Current limit in permit (daily)	34	25	15	38	1.0E-07	-----	-----
Final limit - AMEL	33	84	7.0	19	1.4E-08	51	51
Final limit - MDEL	34	120	16	45	2.8E-08	150	250

PRIORITY POLLUTANTS	Selenium (303d listed)	Copper	Lead	Cyanide	Dioxin-TEQ (303d listed)	Total Ammonia (acute)	Total Ammonia (chronic)
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L N**	**mg/L N**
Max Effl Conc (MEC)	47	6.2	1.7	21	4.8E-09	3.346	3.346

5. Selenium Mass Emission Limitation – Discharge Point No. 001

SIP section 2.1.1 states that for bioaccumulative compounds on the 303(d) list, the Regional Water Board should consider whether mass-loading limits should be limited to current levels. The Regional Water Board finds that mass-loading limits are warranted for selenium. The purpose of this mass-loading limit is to further ensure that this Discharger maintains its existing selenium treatment performance, and does not further contribute to impairment of the narrative objective for bioaccumulation in San Pablo Bay, pending a TMDL.

The mass emission limit is based on the average monthly effluent limitation (calculated above) and the long-term average daily effluent flows (as reported in the Report of Waste Discharge). The mass loading limit is calculated using the average monthly effluent limitation, instead of the maximum daily effluent limitation, because the average monthly effluent limitation better represents long-term performance.

The mass loading limit is calculated using the following equation.

Mass Emission (kg/day) = (Flow, MGD)x(Selenium Concentration, mg/L)x3.785
Mass Emission (kg/day) = 6.6 MGD x 0.033 mg/L x 3.785 = 0.82 kg/day

The existing mass emission limitation imposed under Order No. R2-2010-0057 for selenium is 0.92 kg/day as a running annual average. Because the newly-calculated mass emission limit is more stringent than the existing mass emission limits, this Order will require compliance with the more stringent, newly computed mass emission limit of 0.82 kg/day.

The mass emission limit is expressed as a running annual average to be consistent with the limit in the previous Order. The running annual average is the arithmetic average of the current day's mass load and the mass loads for each of the previous 364 days, as shown in the following example:

Annual Mass emission rate (kg/day) = $\frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$

where:

N = number of samples analyzed in any calendar year
Q_i = flow rate (MGD) associated with the Ith sample
C_i = selenium concentration (mg/L) associated with the Ith sample

Flow (MGD) = Average of monthly plant effluent flows.

Anti-backsliding requirements are satisfied because the mass-loading limit in this Order is more stringent than the mass-loading limit in the previous Order.

6. Whole Effluent Acute Toxicity

This Order includes effluent limitations for whole-effluent acute toxicity for Discharge Point No. 001 that are unchanged from the previous Order and based on the Basin Plan section 4.5.5.3.1. All bioassays are to be performed using the most up-to-date USEPA protocol and the most sensitive species as specified in writing by the Executive Officer based on the most recent screening test results. Bioassays shall be conducted in compliance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, currently 5th Edition (EPA-821-R-02-012), with exceptions granted to the Discharger by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP) upon the Discharger's request with justification.

7. Whole Effluent Chronic Toxicity

This Order includes effluent limitations for chronic toxicity that are unchanged from the previous Order and based on section 4.5.5.3.2 of the Basin Plan. The permit requirements for chronic toxicity are also consistent with the CTR and SIP section 4, Toxicity Control Provisions.

8. Effluent Limitation Adjustments for Recycled Water Use

This Order provides for effluent limitation adjustments for recycled water use to encourage wastewater recycling, consistent with Basin Plan section 4.16 and State Water Board Resolutions 77-1 and 2009-0011, and to account for the increase in pollutant concentrations that may result.

Discharge Specification IV.A.6 of the previous Order granted effluent limitation adjustments for recycled water use under specific conditions. Provision VI.C.6 of the previous Order required that, prior to obtaining mass or concentration adjustments for recycled water, the Discharger submit a technical report that demonstrated such credits would not cause impairment of the beneficial uses in the vicinity of its discharge. Provision VI.C.6 further required the Discharger to include one or more examples of how the credit calculations would be performed and reported based on site-specific conditions.

Consistent with the requirements of Provision VI.C.6, the Discharger submitted a technical report dated October 2006 titled, *Permit Provision C.6 Recycled Water Credits Technical Report* to the Regional Water Board. On February 20, 2007, by letter, the Regional Water Board approved recycled water adjustments as described in the October 2006 technical report. Relevant findings of the Discharger's October 2006 technical report are summarized below:

a. The Discharger uses approximately 3.4 MGD of tertiary treated recycled water from EBMUD's North Richmond Water Reclamation Plant in refinery cooling towers.

b. The Discharger generates approximately 3.5 MGD of recycled water at the Facility by treating secondary effluent from West County Wastewater District's Water Pollution Control Plant through microfiltration and reverse osmosis suitable for use as boiler feedwater.

c. Two waste streams are produced from the microfiltration and reverse osmosis processes used to treat secondary effluent from West County Wastewater District's Water Pollution Control Plant:

   i. Microfiltration backwash – recycled back to the West County Wastewater District's Water Pollution Control Plant for treatment.

   ii. Reverse osmosis reject water is discharged to the Chevron industrial wastewater treatment system prior to the final compliance monitoring point for Discharge Point No. 001. The quantity of reject water is approximately 0.525 MGD.

d. The pollutant concentrations contained in the North Richmond Water Reclamation Plant's tertiary effluent will be used to calculate the total mass of pollutants for which the Discharger may receive recycled water adjustments (including flows from West County Wastewater District's Water Pollution Control Plant). The use of the higher quality tertiary-treated effluent results in a conservative estimate for the recycled water adjustments.

e. Acute and chronic whole effluent toxicity tests and two priority pollutant scans conducted on reverse osmosis reject water and blended reverse osmosis reject water with the Discharger's effluent indicate that toxicity is not anticipated to contribute to exceedances of water quality objectives.

Consistent with Basin Plan section 4.16 and State Water Board Resolutions 77-1 and 2009-0011, this Order carries over concentration adjustments as described in the Discharger's October 2006 technical report for non-bioaccumulative WQBELs (cyanide, lead, and copper). As dioxins will be regulated through a waste load allocation in a TMDL, additional concentration adjustments for dioxins are not provided in this Order. For selenium, this Order grants a concentration adjustment because recent work has reduced some uncertainties regarding selenium sources, fate, and transport, and suggests that some assimilative capacity remains in the receiving water.

While the Regional Water Board supports the use of recycled water, impacts to water quality must be considered within San Pablo Bay near the discharge location. Thus, it's appropriate to determine maximum recycled water adjustments available for the discharge that will be protective of water quality. As explained in section IV.C.4.b of this Fact Sheet, this Order limits dilution to 10:1 for conservative pollutants, 8:1 for selenium, and does not grant dilution for other bioaccumlative pollutants where there is evidence that they are accumulating to unsafe levels in wildlife. However, it may be infeasible for the Discharger to implement recycled water projects without sufficient adjustments to effluent limits to account for its use of recycled water, thus an appropriate balance that protects the beneficial uses of the receiving water and encourages the continued use of recycled water must be determined. In this case, the Discharger's dilution study shows a minimum dilution of at least 34:1. Since section 1.4.2.2 of the SIP requires that mixing zones be as small as practicable, it is appropriate to consider a dilution factor smaller than that shown in the Discharger's dilution study. In this case, a dilution factor of 20:1 is considered reasonable as a balance between encouraging and supporting reclamation, and protecting water quality. The use of a 20:1 dilution is consistent with the development of the maximum allowable concentrations used in the previous Order to become eligible to receive recycled water adjustments. Maximum effluent limitations with the application of recycled water adjustments have been determined for applicable non-bioaccumulative WQBELs (copper, lead, and cyanide)

and selenium. These values have been calculated based on site-specific objectives, effluent data, and receiving water data (as summarized for the calculation of WQBELs in section IV.C.3 of this Fact Sheet) and applied as maximum effluent limitations available when recycled water adjustments are applied. The applicable maximum effluent limitations with the application of recycled water adjustments are summarized below:

Table F-21. Effluent Limitation Calculations for Discharge Point No. 001

Parameter	Units	Maximum Recycled Water Adjusted Effluent Limitations[1]	
		Average Monthly	Maximum Daily
Cyanide	µg/L	38	90
Copper	µg/L	170	240
Lead	µg/L	13	30
Selenium	µg/L	82	130

The use of recycled water will not increase the mass of pollutants discharged to the San Francisco Bay watershed (i.e., bioaccumlative pollutants will be discharged at the same levels or less than would otherwise be discharged to San Pablo Bay without reclamation), and therefore, the granting of mass adjustments for such pollutants is protective of water quality and consistent with anti-degradation requirements.

Recycled water adjustments shall be determined as specified in section V.A.6 of the Order.

9. Stormwater Limits

Based on the requirements of 40 CFR 419 Subpart B for stormwater discharges, this Order establishes technology-based limitations for Discharge Points 002 – 023. This Order also retains the narrative stormwater limits of no visible oil or color.

If the limitation for total organic carbon (TOC) or oil and grease is exceeded, the additional limitations become immediately effective for the discharge point where that exceedance occurred. Derivation of the stormwater effluent limitations based on 40 CFR 419 Subpart B is presented in detail in Attachment F-1 to this Order. The additional effluent limit on pH of 6.0 to 9.0 from 40 CFR 419 Subpart B is not established by this Order. The Basin Plan pH effluent limit for shallow water discharges of 6.5 to 8.5 is retained instead to satisfy anti-backsliding requirements.

D. Anti-backsliding and Antidegradation

1. Anti-backsliding

CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous Order, with some exceptions in which limitations may be relaxed. WQBEL calculations and compliance with anti-backsliding requirements are discussed for each pollutant with a WQBEL in Fact Sheet section IV.C.4.c.

Because the RPA showed no Reasonable Potential for nickel or heptachlor epoxide at Discharge Point No. 001, the limitations in the previous permit are not retained in this Order. State Water Board Order WQ 2001-16 found, “Anti-backsliding does not necessarily dictate that a pollutant that was limited in a prior permit must have a limit in a later permit, even

though the pollutant has never been detected and its discharge does not have the Reasonable Potential to cause or contribute to a water quality standards violation." The logic of State Water Board Order WQ 2001-16 also applies to situations where a pollutant is detected, but no longer triggers reasonable potential. The removal of limits for these pollutants is therefore consistent with State Water Board Order WQ 2001-16 and anti-backsliding requirements.

Technology-based limitations in this Order for Discharge Point 001 are higher (appear less stringent) than corresponding limitations in the previous permit. The method for deriving these limits is presented in the *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category* (40 CFR 419) and is explained in Attachment F-1. The derivation of limits depends on the process configuration of the refinery, which, in turn, depends on the feedstock rate of each process. Based on information provided by the Discharger in its application for permit reissuance, during the term of the previous permit, feedstock rates for certain refinery processes increased, resulting in different "process configuration values" used in the derivation of effluent limitations and higher effluent limitations. In such cases, anti-backsliding requirements under CWA section 402(o)(1) do not apply. This is because the limits are technology-based and were calculated in accordance with federal regulations (40 CFR 419).

2. Antidegradation

Antidegradation policies require that existing water quality be maintained unless degradation is justified based on specific findings. The permitted discharge is consistent with antidegradation policies. This Order continues the level of discharge authorized in the previous Order and thus there will be no degradation of water quality. This is because this Order does not provide for an increase in the permitted design flow or allow for a reduction in the level of treatment.

a. Production-Based Limits

This Order establishes increased technology-based mass loading limits for BOD, TSS, oil and grease, phenolic compounds, ammonia, sulfide, total chromium, and hexavalent chromium consistent with applicable effluent guidelines. This is the result of increased feedstock rates to certain refinery processes that result in the derivation of increased effluent limitations consistent with the applicable effluent guidelines.

In 1990, the State Water Board adopted an administrative procedures update (APU 90-004) that specified guidance to the Regional Water Boards for implementing the State and federal antidegradation policies. The guidance states "… if the Regional Water Board has no reason to believe that existing water quality will be reduced due to the proposed action, no antidegradation analysis is required." The new mass loading limits for BOD, TSS, oil and grease, phenolic compounds, ammonia (as N), sulfide, total chromium, and hexavalent chromium will not result in a significant reduction of water quality.

The total effluent flow rate is a function of production. No increase in production, and therefore in flow, is authorized. These requirements mean that the mass of BOD, TSS, oil and grease, phenolic compounds, ammonia, sulfide, total chromium, and hexavalent chromium discharged is unlikely to increase despite the increased mass loading limitations. The Discharger proposes no changes to its treatment process, and no decrease in treatment is authorized. Furthermore, it is impossible for the Discharger to manipulate its treatment processes to adjust effluent levels of these pollutants independently of others. To maintain

compliance with other effluent limitations, the Discharger will have to at least maintain its existing performance.

The technology-based mass limitations are consistent with applicable statutes and regulations. They are derived from the applicable effluent guidelines for integrated refineries based on Effluent Limitations Guidelines for the Petroleum Refining Point Source Category (40 CFR 419) and represent Best Practicable Control Technology (BPT) and Best Conventional Pollutant Control Technology (BCT). They therefore represent the best practicable treatment or control available. San Pablo Bay meets water quality standards for all pollutants subject to the technology-based mass limits in this Order, and no increase in pollutant loading is likely. The new limits are therefore consistent with federal and State antidegradation policies.

Because antidegradation requirements are met, there will be no lowering of water quality; therefore, further analysis is unnecessary. Findings authorizing degradation are also unnecessary.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Receiving water limitations are retained from the previous Order and reflect applicable water quality standards from Basin Plan Chapter 3, with the exception of ammonia. The receiving water limits for ammonia have been removed from this Order to avoid redundancy with the effluent limitations for ammonia at Discharge Point No. 001.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The principal purposes of a monitoring program by a discharger are to:

- Document compliance with waste discharge requirements and prohibitions,
- Facilitate self-policing in the prevention and abatement of pollution arising from waste discharge, and
- Develop or assist in the development of limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and prepare water and wastewater quality inventories.

The MRP is a standard requirement in almost all NPDES permits issued by the Regional Water Board, including this Order. It contains definitions of terms and sets out requirements for reporting of routine monitoring data in accordance with NPDES regulations, the CWC, and Regional Water Board policies. The MRP also defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all parameters for which effluent limitations are specified. Monitoring for additional constituents, for which no effluent limitations are established, is also required to provide data for future completion of RPAs.

A. Influent Monitoring

This Order does not require the Discharger to conduct monitoring of Facility influent. However, the Discharger has the option of using recycled water in exchange for adjustments, in which case the

Discharger will need to conduct monitoring of influent at I-001. Optional monitoring for parameters for which recycled water adjustments are available has been established.

B. Effluent Monitoring

The SIP states that the Regional Water Board will require periodic monitoring for pollutants for which criteria or objectives apply and for which no effluent limitations have been established. This Order requires the Discharger to conduct semi-annual monitoring at Monitoring Locations E-001 for all CTR priority pollutants, as discussed in the MRP (Attachment E) and in accordance with the Regional Standard Provisions (Attachment G). The Regional Water Board will use the additional data in the future to conduct an RPA and determine if WQBELs are required.

To demonstrate compliance with effluent limitations, this Order retains most effluent monitoring requirements from the previous Order. Important changes are summarized below.

1. Discharge Point No. 001

Monthly monitoring for COD has been established in order to demonstrate compliance by the Discharger with the newly established effluent limitations for this parameter. Since the Discharger no longer triggers reasonable potential for heptachlor epoxide or nickel, the monitoring frequency for these two parameters has been reduced to semi-annual. Specific requirements for mercury and PCB monitoring have not been retained in the MRP because both of these pollutants are now regulated by Order No. R2-2007-0077, as amended.

2. Discharge Point Nos. 002 – 023

In the Report of Waste Discharge, the Discharger requested permission to discontinue the use of Discharge Point Nos. 015 and 016 and transfer flow from the basins to Discharge Point No. 20. Discharge Point Nos. 015, 016, and 020 each discharge non-industrial stormwater, and each are subject to the same effluent limitations. Therefore, this Order discontinues monitoring of Discharge Point Nos. 015 and 016 and associated monitoring requirements at Monitoring Locations E-015 and 016.

C. Whole Effluent Toxicity Testing Requirements

1. **Acute Toxicity.** Weekly 96-hour bioassay testing is required at Monitoring Location E-001 to demonstrate compliance with the effluent limitation for acute toxicity.

2. **Chronic Toxicity.** Chronic whole effluent toxicity testing is required at Monitoring Location E-001 on a quarterly basis in order to demonstrate compliance with effluent limitations for chronic toxicity.

D. Receiving Water Monitoring

On April 15, 1992, the Regional Water Board adopted Resolution No. 92-043, directing the Executive Officer to implement the San Francisco Bay Regional Monitoring Program for Trace Substances. Subsequently, the Executive Officer required major permit holders in the Region, under authority of CWC section 13267, to report on the water quality of the estuary. These permit holders responded by participating in a collaborative effort through the San Francisco Estuary

Institute. This effort has come to be known as the Regional Monitoring Program (RMP). This Order specifies that the Discharger shall continue to participate in the RMP, which involves collection of data on pollutants and toxicity in the water, sediment, and biota of the estuary.

This Order also requires that the Discharger collect quarterly receiving water samples near its outfall for pH, temperature, dissolved oxygen, ammonia, salinity, and hardness. The purpose of this monitoring is to collect (1) basic information on the quality of receiving waters in the vicinity of the discharge, and (2) recent salinity and hardness data to determine the need for water quality based effluent limits in the next permit reissuance. For this Order, Regional Board staff used a very conservative hardness value of 59 mg/L in the calculation of effluent limits for lead. This value was used because of the limited amount of data available in the vicinity of the discharge point. With the next permit reissuance, it would be appropriate to use the site-specific hardness and salinity data required by this Order.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions (Provision VI.A)

Federal Standard Provisions, which in accordance with 40 CFR 122.41 and 122.42 apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachment D of this Order. 40 CFR 122.41(a)(1) and (b) through (n) establish conditions that apply to all state issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order. 40 CFR 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. The Regional Standard Provisions (Attachment G) supplement the Federal Standard Provisions. In accordance with 40 CFR 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFR 122.41(j)(5) and (k)(2) because the enforcement authority under CWC is more stringent. In lieu of these conditions, this Order incorporates by reference CWC section 13387(e).

B. Monitoring and Reporting Requirements (Provision VI.B)

The Discharger is required to monitor the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are contained in the MRP (Attachment E) and the Regional Standard Provisions (Attachment G). This provision requires compliance with these documents and is authorized by 40 CFR 122.41(h) and (j), and CWC section 13267 and 13383.

C. Special Provisions (Provision VI.C)

1. Reopener Provisions

These provisions are based on 40 CFR 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated WQOs, regulations, or other new relevant information that may be established in the future and other circumstances allowed by law.

2. Special Studies and Additional Monitoring

a. Effluent Characterization Study.

This Order does not include effluent limitations for the selected constituents addressed in the Regional Standard Provisions (Attachment G) that do not demonstrate Reasonable Potential, but this provision requires the Discharger to continue monitoring for these pollutants as described in the Regional Standard Provisions and as specified in the MRP. If concentrations of these constituents increase significantly, the Discharger is required to investigate the sources of the increases and establish remedial measures, if the increases result in reasonable potential to cause or contribute to an excursion above water quality standards. This provision is based on the Basin Plan, the SIP, and CWC 13267.

b. Ambient Background Receiving Water Study.

This provision is based on the Basin Plan, the SIP, CWC 13267 and the Regional Standard Provisions (Attachment G). As indicated in this Order, this requirement may be met by participating in a collaborative study.

c. Effluent and Receiving Water Selenium Characterization Study.

This Order requires the Discharger to characterize: (a) the concentrations and speciation of selenium in effluent and receiving water, (b) the variability of selenium in the discharge, (c) the potential for uptake and conversion of selenium to more bioavailable forms, (d) mixing and dilution in the receiving water, and (e) the ability to comply with any more-stringent selenium criteria that may become effective in the foreseeable future. These requirements are reasonable and warranted because the Discharger discharges selenium into San Pablo Bay. Based on the results of the studies, the Regional Water Board will be able to evaluate better how the Discharger contributes to the selenium impairment of San Francisco Bay. The Regional Water Board may use the data to evaluate dilution credits, characterize selenium bioaccumulation potential and ecological risk, and evaluate receiving water quality with respect to selenium. The Regional Water Board may also use the data to determine whether receiving water quality correlates with seasonal or other environmental factors. CWC 13267 authorizes the Regional Water Board to require these studies.

d. Dilution Modeling Update and Verification. As described in Fact Sheet section IV.C.4.b, the Discharger provided a dilution modeling study in November 1987 (*In-Situ Measurement of Dilution of Chevron Effluent in San Pablo Bay*). There is no compelling evidence that this study's results are not valid as justification for the dilution credits in this permit. However, because it was conducted over 20 years ago, it is reasonable to verify its results with a new updated study for the next permit reissuance.

3. Best Management Practices and Pollution Minimization

The provisions related to PMP development and implementation are based on Basin Plan section 4.12.2 and SIP section 2.4.5.

4. Other Special Provisions

a. Cyanide Action Plan.

This provision is based on Basin Plan section 4.7.2.2. It is necessary to ensure that use of cyanide site-specific objectives is consistent with antidegradation policies.

b. Copper Action Plan.

This provision is based on Basin Plan section 7.2.1.2. It is necessary to ensure that use of copper site-specific objectives is consistent with antidegradation policies.

c. Stormwater Pollution Prevention Plan and Annual Report.

This provision is based on Basin Plan section 4.8, statewide stormwater requirements for industrial facilities, and applicable USEPA regulations. It is retained from the previous Order.

d. Wastewater Discharges from the Wetland.

This provision is based on the Consent Decree *United States v. Chevron Industries Inc.*, Civil No. C98-3966-MEJ and DOJ No. 90-11-3-1398. The Consent Decree required, in part, that Chevron increase the design capacity of its GAC facility to 20 MGD and to use that capacity to treat refinery wastewater, except for 3 MGD, which may be treated by Chevron's wetland as long as wetland effluent meets toxicity standards established in the Consent Decree (i.e., 80% survival).

For the last five years the Discharger has routed all wetland effluent to the GAC facility before discharge to San Pablo Bay; however, the Discharger has indicated that it would like to retain the option to discharge up to 3 MGD of wetland effluent directly to Discharge Point No. 001. To ensure that such a discharge will not pose a threat to water quality, this Order requires, consistent with the Consent Decree, that the Discharger document that wetland effluent that bypasses the GAC facility will not cause acute toxicity and that the quantity is limited to 3 MGD or less.

VIII. PUBLIC PARTICIPATION

The Regional Water Board is considering the issuance of WDRs that will serve as a NPDES permit for the Chevron Richmond Refinery. As a step in the WDR adoption process, the Regional Water Board has developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided by publication in the Martinez News Gazette on May 12, 2011.

B. Written Comments

Staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the Executive Officer at the Regional Water Board at the address on the cover page of this Order, to the attention of Robert Schlipf.

To receive a full response from Regional Water Board staff and to be considered by the Regional Water Board, written comments should be received at the Regional Water Board offices by **5:00 p.m. on June 13, 2011.**

C. Public Hearing

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: July 13, 2011
Time: 9:00 am
Location: Elihu Harris State Office Building
1515 Clay Street, 1st Floor Auditorium
Oakland, CA 94612

Contact: Robert Schlipf**,** (510) 622-2478, email RSchlipf@waterboards.ca.gov

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. The Regional Water Board's Web address is http://www.waterboards.ca.gov/sanfranciscobay where one can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Board to review the decision of the Regional Water Board regarding the WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge, related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday, except from noon to 1:00 p.m. Copying of documents may be arranged by calling 510-622-2300.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference this facility, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to Robert Schlipf at 510-622-2478 (e-mail at RSchlipf@waterboards.ca.gov).

ATTACHMENT F-1

Derivation of Technology-Based Effluent Limitations
Chevron Richmond Refinery

References

1. 40 CFR 419 – Integrated Subcategory, *Effluent Limitation Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category* (2006)

2. *Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category*, EPA 440/1-82-014 (1982)

3. *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry*, USEPA Office of Water Regulations and Standards (1985)

4. Chevron, Richmond Refinery, NPDES Application for Permit Renewal, NPDES Permit No. CA0005134 (December 7, 2010)

5. Refinery Production Data from NPDES Application for Permit Renewal

Applicable Definitions

Process Waste Water means any water, which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. [40 CFR 401.11(q)]

Runoff means the flow of stormwater resulting from precipitation coming into contact with petroleum refinery property. [40 CFR 419.11(b)]

Contaminated Runoff means runoff that comes into contact with any raw material, intermediate product, finished product, by-product or waste product located on petroleum refinery property.
[40 CFR 419.11(g)]

Background

Effluent Limitations Guidelines (ELGs) for the Integrated Subcategory of the Petroleum Refining Point Source Category at 40 CFR 419 Subpart E are based, in part, on a discharger's production rate. The Discharger's current production rate is 243,970 barrels per day (bbls/day).

Process Wastewaters. The ELGs include limitations for process wastewaters based on best practicable control technology currently available (BPT), best available technology economically achievable (BAT), and best conventional pollutant control technology (BCT). Specific BPT, BAT, and BCT effluent limitations that apply to the Discharger must be derived using methods described by the ELGs and take into account such factors as production rate, as well as refinery processes and configuration. The most stringent of BPT, BAT, and BCT limitations apply.

For derivation of BPT, BAT, and BCT limitations for process wastewaters being discharged at Discharge Point No. 001, size factors and process factors are determined as follows.

Size Factor. At a crude processing rate of 243,970 bbls/day, the appropriate size factors, pursuant to the ELGs at 40 CFR 419.52(b)(1) for BPT, at 40 CFR 419.53(b)(1) for BAT, and at 40 CFR 419.54(b)(1) for BCT, for derivation of technology-based effluent limitations is 1.04

Process Factor. The process configuration for each process is determined by summing the process feedstock rates for each crude, cracking and coking, lube, and asphalt process at the refinery. Each individual feedstock rate is multiplied by the capacity relative to the throughput, and a weight factor specific for each process, to derive a "process configuration," which in turn is used to determine a "process factor" in accordance with the ELGs at 40 CFR 419.52(b) (2) for BPT, at 40 CFR 419.53(b)(2) for BAT, and at 40 CFR 419.54(b)(2) for BCT.

Processes considered in deriving the process factors are those processes within the crude and cracking and coking categories as reported by the Discharger, which correspond to the process groups listed within the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 19). The Discharger does not include asphalt processes, so this process group is not considered in determining process factors.

Derivation of the process configuration for a production rate of 243,970 bbls/day is shown in the following table:

Table F-1A. Process Configurations for Discharge Point No. 001

Production at 243,970 bbls/day				
Process	**Process Feedstock Rate (x 1,000 bbls/day)**	**Process/ Feedstock Ratio**	**Weight Factor**	**Process Configuration**
Crude				
Atm. Dist.	244.0	1.000		
Vac. Dist.	101.0	0.414		
Desalt.	244.0	1.000		
Total	589.0	2.414	1	= 2.41
Cracking				
Fluid Catalytic Cracking	77.9	0.319		
Hydrocracking	125.8	0.516		
Hydrotreating	108.8	0.446		
Total	312.5	1.281	6	= 7.68
Lube				
Lube Hydrofinishing	30.4	0.124		
Propane Deasphalting	39.6	0.162		
Total	70.0	0.287	13	= 3.73
Reforming and Alkylation Processes	74.4	0.30	0	0
Total Refinery Configuration at 243,970 bbls/day				**13.8**

The process factor, as determined in accordance with 40 CFR 419.52(b)(2) for BPT, 40 CFR 419.53(b)(2) for BAT, 40 CFR 419.54(b)(2) for BCT, is 2.26

To determine BAT limitations for total and hexavalent chromium and phenolic compounds in process wastewaters, the ELGs require consideration of effluent factors and refinery processes. BAT effluent factors are presented at 40 CFR 419.53(c)(1); the refinery processes considered are the crude, cracking and coking, and reforming and alkylation processes, which correspond to those identified within the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 20).

Contaminated Runoff. The ELGs establish BPT, BAT, and BCT limitations for contaminated runoff, which apply to all stormwater discharges, except stormwater treated and discharged with process wastewaters through Discharge Point 001. ELGs establish effluent limitations for oil and grease and total organic carbon (TOC), and then, if limitations for oil and grease or TOC are exceeded, additional limitations for BOD, TSS, COD, phenolic compounds, total chromium, hexavalent chromium, and pH, found at 40 CFR 419.52(e)(2) and 419.53(f)(2) apply

Determination of Process Wastewater Effluent Limitations at Discharge Point No. 001

BPT. The following table shows the derivation of process wastewater BPT limitations at a production rate of 243,970 bbls/day.

Effluent Limit = (Size Factor)(Process Factor)(Feed Stock Rate)*(Effluent Limit Factor)

Table F-1B. BPT Limitations for Process Wastewaters

	Preliminary Effluent Limitation Factor [1]		Size Factor	Process Factor	Feed Stock Rate	Effluent Limitation [2]	
	Max Daily	Avg Monthly				Max Daily	Avg Monthly
BOD_5	19.2	10.2	1.04	2.26	243.97	11,010	5,849
TSS	13.2	8.4	1.04	2.26	243.97	7,569	4,817
COD	136.0	70	1.04	2.26	243.97	77,986	40,140
Oil & Grease	6.0	3.2	1.04	2.26	243.97	3,441	1,835
Phenolics (4AAP)	0.14	0.068	1.04	2.26	243.97	80	39
Ammonia (as N)	8.3	3.8	1.04	2.26	243.97	4,759	2,179
Sulfide	0.124	0.056	1.04	2.26	243.97	71	32
Total Chromium	0.29	0.17	1.04	2.26	243.97	166	97
Hexavalent Chromium	0.025	0.011	1.04	2.26	243.97	14	6.3
pH	--	--	--	--	--	6.0 – 9.0	

[1] From 40 CFR 419.52(a) (pounds per 1000 bbls of feedstock)
[2] Pounds per day (lbs/day)

BAT. The following table shows the derivation of BAT limitations for process wastewaters at production rates of 243,970 bbls/day.

Table F-1C. BAT Limitations for Process Wastewater

	Preliminary Effluent Limitation Factor [1]		Size Factor	Process Factor	Feed Stock Rate	Effluent Limitation [2]	
	Max Daily	Avg Monthly				Max Daily	Avg Monthly
Production at 243,970 bbls/day							
COD[3]	136	70	1.04	2.26	243.97	77,986	40,140
Ammonia (as N)	8.3	3.8	1.04	2.26	243.97	4,759	2,179
Sulfide	0.124	0.056	1.04	2.26	243.97	71	32

[1] From 40 CFR 419.53(a) (pounds per 1000 bbls of feedstock)
[2] Pounds/day (lbs/day)
[3] In any case in which the applicant can demonstrate that the chloride concentration in the effluent exceeds 1,000 mg/L (1,000 ppm), the Regional Administration may substitute TOC as a parameter in lieu of COD. Effluent limitations for TOC shall be based on effluent data from the plant conrrelating TOC to BOD_5.

BAT limitations for total and hexavalent chromium and phenolic compounds are based on feedstock rates. Figures used in calculations for this Order are shown in the following table.

Table F-1D. Feedstock Rates for Determining BAT Limitations

Refinery Throughput	**243,970 bbls/day**
Crude	
Atmospheric Distillation	244.0
Vacuum Distillation	101.0
Desalting	244.0
Total	**589.0**
Cracking and Coking	
Catalytic Cracking	77.9
Hydrocracking	125.8
Hydrotreating	108.8
Total	**312.5**
Lube	
Lube Hydrofining	30.4
Propane Deasphalting	39.6
Total	**70.0**
Reforming and Alkylation	**74.1**

Based on the total feedstock rates shown above, derivation of BAT limitations for total and hexavalent chromium and phenolic compounds are shown in the following table.

Table F-1E. BAT Limitations for Process Wastewater (Chromium and Phenolics)

Pollutant	Preliminary Effluent Limitations Factor [a]		Feedstock Rate	Effluent Limitations [b]	
	Max Daily	Avg Monthly		Max Daily	Avg Monthly
Production at 243,970 bbls/day					
Phenolic Compounds					
Crude	0.013	0.003	588.98	7.66	1.77
Cracking and Coking	0.147	0.036	312.46	45.93	11.25
Asphalt	0.079	0.019	0.00	0.00	0.00
Lube	0.369	0.090	69.96	25.82	6.30
Reforming and Alkylation	0.132	0.032	74.1	9.78	2.37
Limit (Sum)	---	---	---	**89.18**	**21.68**
Total Chromium					
Crude	0.011	0.004	588.98	6.48	2.36
Cracking and Coking	0.119	0.041	312.46	37.18	12.81
Asphalt	0.064	0.022	0.00	0.00	0.00
Lube	0.299	0.104	69.96	20.92	7.28
Reforming and Alkylation	0.107	0.037	74.1	7.93	2.74
Limit (Sum)	---	---	---	**72.51**	**25.18**
Hexavalent Chromium					
Crude	0.0007	0.0003	588.98	0.41	0.18
Cracking and Coking	0.0076	0.0034	312.46	2.37	1.06
Asphalt	0.0041	0.0019	0.00	0.00	0.00
Lube	0.0192	0.0087	69.96	1.34	0.61
Reforming and Alkylation	0.0069	0.0031	74.1	0.51	0.23
Limit (Sum)	---	---	---	**4.64**	**2.08**

[1] From 40 CFR 419.53(c) (pounds per 1000 bbls of feedstock)
[2] Pounds per day

BCT. The following table shows the derivation of BCT limitations for process wastewaters at production rates of 243,970 bbls/day.

Table F-1F. BCT Limitations for Process Wastewater

Pollutant	Preliminary Effluent Limitations Factor [1]		Size Factor	Process Factor	Feed Stock Rate	Final Effluent Limitations [2]	
	Max Daily	Avg Monthly				Max Daily	Avg Monthly
Production at 243,970 bbls/day							
BOD_5	19.2	10.2	1.04	2.26	243.97	11,010	5,849
TSS	13.2	8.4	1.04	2.26	243.97	7,569	4,817
Oil & Grease	6.0	3.2	1.04	2.26	243.97	3,441	1,835
pH	--	--	--	--	--	6.0 – 9.0	

[1] From 40 CFR 419.54(a) (pounds per 1000 bbls of feedstock)
[2] Pounds per day (lbs/day)

Most Stringent Technology-Based Process Wastewater Effluent Limitations

The following table presents the technology-based process wastewater effluent limitations that apply to the Discharger. The limitations are the most stringent of the BPT, BAT, and BCT limitations required by the ELGs and are expressed in units of lbs/day based on production rates of 243,970 bbls/day.

Table F-1G. Summary of Technology-Based Wastewater Effluent Limitations

	Effluent Limitations [1],[2]	
Pollutant	**Max Daily**	**Avg Monthly**
Production at 243,970 bbls/day		
BOD_5	11,010	5,849
TSS	7,569	4,817
COD	77,986	40,140
Oil & Grease	3,441	1,835
Phenolics (4AAP)	80	22[3]
Ammonia (as N)	4,759	2,179
Sulfide	71	32
Total Cr	73[3]	25[3]
Hex Cr	4.6[3]	2.1[3]
pH	6.0 – 9.0 pH units	

[1] Units are lbs/day
[2] All technology-based limitations for process wastewaters are based on BPT unless otherwise noted.
[3] Based on BAT.

Determination of Effluent Limitation Allocations for Contaminated Runoff

If contaminated stormwater discharges exceed the oil and grease limit (15 mg/L) or the total organic carbon limit (110 mg/L), additional concentration-based limitations for BOD, TSS, COD, phenolics, total chromium, hexavalent chromium, and pH become immediately effective. The effluent limitations for these pollutants are derived from the most stringent of BAT and BPT effluent concentration-based limitations provided in the ELGs. A table summarizing these additional effluent limitations is shown below.

Table F-1H. Additional Stormwater Effluent Limitations

Pollutant	**Units**	**Max Daily[1]**	**Average Monthly[1]**
BOD	mg/L	48	26
TSS		33	21
COD		360	180
Oil and Grease		15	8
Phenolic Compounds		0.35	0.17
Total Chromium		0.60	0.21
Hexavalent Chromium		0.062	0.028
pH	s.u.	6.0 – 9.0	

[1] All effluent limitations reflect BPT requirements from 40 CFR 419.52(e)(2), except limitations for total chromium, which reflect BAT requirements from 40 CFR 419.53(f)(2).

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ATTACHMENT G

REGIONAL STANDARD PROVISIONS, AND MONITORING
AND REPORTING REQUIREMENTS
(SUPPLEMENT TO ATTACHMENT D)

For

NPDES WASTEWATER DISCHARGE PERMITS

March 2010

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

FOR

NPDES WASTEWATER DISCHARGE PERMITS

APPLICABILITY

This document applies to dischargers covered by a National Pollutant Discharge Elimination System (NPDES) permit. This document does not apply to Municipal Separate Storm Sewer System (MS4) NPDES permits.

The purpose of this document is to supplement the requirements of Attachment D, Standard Provisions. The requirements in this supplemental document are designed to ensure permit compliance through preventative planning, monitoring, recordkeeping, and reporting. In addition, this document requires proper characterization of issues as they arise, and timely and full responses to problems encountered. To provide clarity on which sections of Attachment D this document supplements, this document is arranged in the same format as Attachment D.

I. STANDARD PROVISIONS - PERMIT COMPLIANCE

A. Duty to Comply

Not Supplemented

B. Need to Halt or Reduce Activity Not a Defense

Not Supplemented

C. Duty to Mitigate

This supplements I.C. of Standard Provisions (Attachment D)

1. Contingency Plan

The Discharger shall maintain a Contingency Plan as originally required by Regional Water Board Resolution 74-10 and as prudent in accordance with current municipal facility emergency planning. The Contingency Plan shall describe procedures to ensure that existing facilities remain in, or are rapidly returned to, operation in the event of a process failure or emergency incident, such as employee strike, strike by suppliers of chemicals or maintenance services, power outage, vandalism, earthquake, or fire. The Discharger may combine the Contingency Plan and Spill Prevention Plan into one document. Discharge in violation of the permit where the Discharger has failed to develop and implement a Contingency Plan as described below will be the basis for considering the discharge a

willful and negligent violation of the permit pursuant to California Water Code Section 13387. The Contingency Plan shall, at a minimum, contain the provisions of a. through g. below.

a. Provision of personnel for continued operation and maintenance of sewerage facilities during employee strikes or strikes against contractors providing services.

b. Maintenance of adequate chemicals or other supplies and spare parts necessary for continued operations of sewerage facilities.

c. Provisions of emergency standby power.

d. Protection against vandalism.

e. Expeditious action to repair failures of, or damage to, equipment and sewer lines.

f. Report of spills and discharges of untreated or inadequately treated wastes, including measures taken to clean up the effects of such discharges.

g. Programs for maintenance, replacement, and surveillance of physical condition of equipment, facilities, and sewer lines.

2. Spill Prevention Plan

The Discharger shall maintain a Spill Prevention Plan to prevent accidental discharges and minimize the effects of such events. The Spill Prevention Plan shall:

a. Identify the possible sources of accidental discharge, untreated or partially treated waste bypass, and polluted drainage;

b. Evaluate the effectiveness of present facilities and procedures, and state when they became operational; and

c. Predict the effectiveness of the proposed facilities and procedures, and provide an implementation schedule containing interim and final dates when they will be constructed, implemented, or operational.

This Regional Water Board, after review of the Contingency and Spill Prevention Plans or their updated revisions, may establish conditions it deems necessary to control accidental discharges and to minimize the effects of such events. Such conditions may be incorporated as part of the permit upon notice to the Discharger.

D. Proper Operation & Maintenance

This supplements I.D of Standard Provisions (Attachment D)

1. Operation and Maintenance (O&M) Manual

The Discharger shall maintain an O&M Manual to provide the plant and regulatory personnel with a source of information describing all equipment, recommended operational strategies, process control monitoring, and maintenance activities. To remain a useful and

relevant document, the O&M Manual shall be kept updated to reflect significant changes in treatment facility equipment and operational practices. The O&M Manual shall be maintained in usable condition and be available for reference and use by all relevant personnel and Regional Water Board staff.

2. Wastewater Facilities Status Report

The Discharger shall regularly review, revise, or update, as necessary, its Wastewater Facilities Status Report. This report shall document how the Discharger operates and maintains its wastewater collection, treatment, and disposal facilities to ensure that all facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the Discharger's service responsibilities.

3. Proper Supervision and Operation of Publicly Owned Treatment Works (POTWs)

POTWs shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Division 4, Chapter 14, Title 23 of the California Code of Regulations.

E. Property Rights

Not Supplemented

F. Inspection and Entry

Not Supplemented

G. Bypass

Not Supplemented

H. Upset

Not Supplemented

I. Other

This section is an addition to Standard Provisions (Attachment D)

1. Neither the treatment nor the discharge of pollutants shall create pollution, contamination, or nuisance as defined by California Water Code Section 13050.

2. Collection, treatment, storage, and disposal systems shall be operated in a manner that precludes public contact with wastewater, except in cases where excluding the public is infeasible, such as private property. If public contact with wastewater could reasonably occur on public property, warning signs shall be posted.

3. If the Discharger submits a timely and complete Report of Waste Discharge for permit reissuance, this permit continues in force and effect until a new permit is issued or the Regional Water Board rescinds the permit.

J. Stormwater

This section is an addition to Standard Provisions (Attachment D)

These provisions apply to facilities that do not direct all stormwater flows from the facility to the wastewater treatment plant headworks.

1. Stormwater Pollution Prevention Plan (SWPP Plan)

The SWPP Plan shall be designed in accordance with good engineering practices and shall address the following objectives:

a. To identify pollutant sources that may affect the quality of stormwater discharges; and

b. To identify, assign, and implement control measures and management practices to reduce pollutants in stormwater discharges.

The SWPP Plan may be combined with the existing Spill Prevention Plan as required in accordance with Section C.2. The SWPP Plan shall be retained on-site and made available upon request of a representative of the Regional Water Board.

2. Source Identification

The SWPP Plan shall provide a description of potential sources that may be expected to add significant quantities of pollutants to stormwater discharges, or may result in non-stormwater discharges from the facility. The SWPP Plan shall include, at a minimum, the following items:

a. A topographical map (or other acceptable map if a topographical map is unavailable), extending one-quarter mile beyond the property boundaries of the facility, showing the wastewater treatment facility process areas, surface water bodies (including springs and wells), and discharge point(s) where the facility's stormwater discharges to a municipal storm drain system or other points of discharge to waters of the State. The requirements of this paragraph may be included in the site map required under the following paragraph if appropriate.

b. A site map showing the following:

(1) Stormwater conveyance, drainage, and discharge structures;

(2) An outline of the stormwater drainage areas for each stormwater discharge point;

(3) Paved areas and buildings;

(4) Areas of actual or potential pollutant contact with stormwater or release to stormwater, including but not limited to outdoor storage and process areas; material loading, unloading, and access areas; and waste treatment, storage, and disposal areas;

(5) Location of existing stormwater structural control measures (i.e., berms, coverings, etc.);

(6) Surface water locations, including springs and wetlands; and

(7) Vehicle service areas.

c. A narrative description of the following:

(1) Wastewater treatment process activity areas;

(2) Materials, equipment, and vehicle management practices employed to minimize contact of significant materials of concern with stormwater discharges;

(3) Material storage, loading, unloading, and access areas;

(4) Existing structural and non-structural control measures (if any) to reduce pollutants in stormwater discharges; and

(5) Methods of on-site storage and disposal of significant materials.

d. A list of pollutants that have a reasonable potential to be present in stormwater discharges in significant quantities.

3. Stormwater Management Controls

The SWPP Plan shall describe the stormwater management controls appropriate for the facility and a time schedule for fully implementing such controls. The appropriateness and priorities of controls in the SWPP Plan shall reflect identified potential sources of pollutants. The description of stormwater management controls to be implemented shall include, as appropriate:

a. Stormwater pollution prevention personnel

Identify specific individuals (and job titles) that are responsible for developing, implementing, and reviewing the SWPP Plan.

b. Good housekeeping

Good housekeeping requires the maintenance of clean, orderly facility areas that discharge stormwater. Material handling areas shall be inspected and cleaned to reduce the potential for pollutants to enter the storm drain conveyance system.

c. Spill prevention and response

Identify areas where significant materials can spill into or otherwise enter stormwater conveyance systems and their accompanying drainage points. Specific material handling procedures, storage requirements, and cleanup equipment and procedures shall be identified, as appropriate. The necessary equipment to implement a cleanup shall be available, and personnel shall be trained in proper response, containment, and cleanup

of spills. Internal reporting procedures for spills of significant materials shall be established.

d. Source control

Source controls include, for example, elimination or reduction of the use of toxic pollutants, covering of pollutant source areas, sweeping of paved areas, containment of potential pollutants, labeling of all storm drain inlets with “No Dumping” signs, isolation or separation of industrial and non-industrial pollutant sources so that runoff from these areas does not mix, etc.

e. Stormwater management practices

Stormwater management practices are practices other than those that control the sources of pollutants. Such practices include treatment or conveyance structures, such as drop inlets, channels, retention and detention basins, treatment vaults, infiltration galleries, filters, oil/water separators, etc. Based on assessment of the potential of various sources to contribute pollutants to stormwater discharges in significant quantities, additional stormwater management practices to remove pollutants from stormwater discharges shall be implemented and design criteria shall be described.

f. Sediment and erosion control

Measures to minimize erosion around the stormwater drainage and discharge points, such as riprap, revegetation, slope stabilization, etc., shall be described.

g. Employee training

Employee training programs shall inform all personnel responsible for implementing the SWPP Plan. Training shall address spill response, good housekeeping, and material management practices. New employee and refresher training schedules shall be identified.

h. Inspections

All inspections shall be done by trained personnel. Material handling areas shall be inspected for evidence of, or the potential for, pollutants entering stormwater discharges. A tracking or follow up procedure shall be used to ensure appropriate response has been taken in response to an inspection. Inspections and maintenance activities shall be documented and recorded. Inspection records shall be retained for five years.

i. Records

A tracking and follow-up procedure shall be described to ensure that adequate response and corrective actions have been taken in response to inspections.

4. Annual Verification of SWPP Plan

An annual facility inspection shall be conducted to verify that all elements of the SWPP Plan are accurate and up-to-date. The results of this review shall be reported in the Annual Report to the Regional Water Board described in Section V.C.f.

K. Biosolids Management

This section is an addition to Standard Provisions (Attachment D)

Biosolids must meet the following requirements prior to land application. The Discharger must either demonstrate compliance or, if it sends the biosolids to another party for further treatment or distribution, must give the recipient the information necessary to ensure compliance.

1. Exceptional quality biosolids meet the pollutant concentration limits in Table III of 40 CFR Part 503.13, Class A pathogen limits, and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8). Such biosolids do not have to be tracked further for compliance with general requirements (503.12) and management practices (503.14).

2. Biosolids used for agricultural land, forest, or reclamation shall meet the pollutant limits in Table I (ceiling concentrations) and Table II or Table III (cumulative loadings or pollutant concentration limits) of 503.13. They shall also meet the general requirements (503.12) and management practices (503.14) (if not exceptional quality biosolids) for Class A or Class B pathogen levels with associated access restrictions (503.32) and one of the 10 vector attraction reduction requirements in 503.33(b)(1)-(b)(10).

3. Biosolids used for lawn or home gardens must meet exceptional quality biosolids limits.

4. Biosolids sold or given away in a bag or other container must meet the pollutant limits in either Table III or Table IV (pollutant concentration limits or annual pollutant loading rate limits) of 503.13. If Table IV is used, a label or information sheet must be attached to the biosolids packing that explains Table IV (see 503.14). The biosolids must also meet the Class A pathogen limits and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8).

II. STANDARD PROVISIONS – PERMIT ACTION

Not Supplemented

III. STANDARD PROVISIONS – MONITORING

A. Sampling and Analyses

This section is a supplement to III.A and III.B of Standard Provisions (Attachment D)

1. Use of Certified Laboratories

Water and waste analyses shall be performed by a laboratory certified for these analyses in accordance with California Water Code Section 13176.

2. Use of Appropriate Minimum Levels

Table C lists the suggested analytical methods for the 126 priority pollutants and other toxic pollutants that should be used, unless a particular method or minimum level (ML) is required in the MRP.

For priority pollutant monitoring, when there is more than one ML value for a given substance, the Discharger may select any one of the analytical methods cited in Table C for compliance determination, or any other method described in 40 CFR part 136 or approved by USEPA (such as the 1600 series) if authorized by the Regional Water Board. However, the ML must be below the effluent limitation and water quality objective. If no ML value is below the effluent limitation and water quality objective, then the method must achieve an ML no greater than the lowest ML value indicated in Table C. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

3. Frequency of Monitoring

The minimum schedule of sampling analysis is specified in the MRP portion of the permit.

a. Timing of Sample Collection

(1) The Discharger shall collect samples of influent on varying days selected at random and shall not include any plant recirculation or other sidestream wastes, unless otherwise stipulated by the MRP.

(2) The Discharger shall collect samples of effluent on days coincident with influent sampling unless otherwise stipulated by the MRP or the Executive Officer. The Executive Officer may approve an alternative sampling plan if it is demonstrated to be representative of plant discharge flow and in compliance with all other permit requirements.

(3) The Discharger shall collect grab samples of effluent during periods of day-time maximum peak effluent flows (or peak flows through secondary treatment units for facilities that recycle effluent flows).

(4) Effluent sampling for conventional pollutants shall occur on at least one day of any multiple-day bioassay test the MRP requires. During the course of the test, on at least one day, the Discharger shall collect and retain samples of the discharge. In the event a bioassay test does not comply with permit limits, the Discharger shall analyze these retained samples for pollutants that could be toxic to aquatic life and for which it has effluent limits.

(a). The Discharger shall perform bioassay tests on final effluent samples; when chlorine is used for disinfection, bioassay tests shall be performed on effluent after chlorination-dechlorination; and

(b) The Discharger shall analyze for total ammonia nitrogen and calculate the amount of un-ionized ammonia whenever test results fail to meet the percent survival specified in the permit.

b. Conditions Triggering Accelerated Monitoring

(1) If the results from two consecutive samples of a constituent monitored in a 30-day period exceed the monthly average limit for any parameter (or if the required sampling frequency is once per month and the monthly sample exceeds the monthly average limit), the Discharger shall, within 24 hours after the results are received, increase its sampling frequency to daily until the results from the additional sampling show that the parameter is in compliance with the monthly average limit.

(2) If any maximum daily limit is exceeded, the Discharger shall increase its sampling frequency to daily within 24 hours after the results are received that indicate the exceedance of the maximum daily limit until two samples collected on consecutive days show compliance with the maximum daily limit.

(3) If final or intermediate results of an acute bioassay test indicate a violation or threatened violation (e.g., the percentage of surviving test organisms of any single acute bioassay test is less than 70 percent), the Discharger shall initiate a new test as soon as practical, and the Discharger shall investigate the cause of the mortalities and report its findings in the next self monitoring report (SMR).

(4) The Discharger shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate control and reliable operation. If an effluent violation is detected, the Discharger shall collect grab samples at least every 30 minutes until compliance with the limit is achieved, unless the Discharger monitors chlorine residual continuously. In such cases, the Discharger shall continue to conduct continuous monitoring as required by its permit.

(5) When a bypass occurs (except one subject to provision III.A.3.b.6 below), the Discharger shall monitor flows and collect samples on a daily basis for all constituents at affected discharge points that have effluent limits for the duration of the bypass (including acute toxicity using static renewals), except chronic toxicity, unless otherwise stipulated by the MRP.

(6) Unless otherwise stipulated by the MRP, when a bypass approved pursuant to Attachment D, Standard Provisions, Sections I.G.2 or I.G.4, occurs, the Discharger shall monitor flows and, using appropriate procedures as specified in the MRP, collect and retain samples for affected discharge points on a daily basis for the duration of the bypass. The Discharger shall analyze for total suspended solids (TSS) using 24-hour composites (or more frequent increments) and for bacteria indicators with effluent limits using grab samples. If TSS exceeds 45 mg/L in any composite sample, the Discharger shall also analyze the retained samples for that discharge for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. Additionally, at least once each year, the Discharger shall analyze the retained samples for one approved bypass discharge event for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. This monitoring shall be in addition to the minimum monitoring specified in the MRP.

c. Stormwater Monitoring

The requirements of this section only apply to facilities that are not covered by an NPDES permit for stormwater discharges and where not all site storm drainage from process areas (i.e., areas of the treatment facility where chemicals or wastewater could come in contact with stormwater) is directed to the headworks. For stormwater not directed to the headworks during the wet season (October 1 to April 30), the Discharger shall:

(1) Conduct visual observations of the stormwater discharge locations during daylight hours at least once per month during a storm event that produces significant stormwater discharge to observe the presence of floating and suspended materials, oil and grease, discoloration, turbidity, and odor, etc.

(2) Measure (or estimate) the total volume of stormwater discharge, collect grab samples of stormwater discharge from at least two storm events that produce significant stormwater discharge, and analyze the samples for oil and grease, pH, TSS, and specific conductance.

The grab samples shall be taken during the first 30 minutes of the discharge. If collection of the grab samples during the first 30 minutes is impracticable, grab samples may be taken during the first hour of the discharge, and the Discharger shall explain in the Annual Report why the grab sample(s) could not be taken in the first 30 minutes.

(3) Testing for the presence of non-stormwater discharges shall be conducted no less than twice during the dry season (May 1 to September 30) at all stormwater discharge locations. Tests may include visual observations of flows, stains, sludges, odors, and other abnormal conditions; dye tests; TV line surveys; or analysis and validation of accurate piping schematics. Records shall be maintained describing the method used, date of testing, locations observed, and test results.

(4) Samples shall be collected from all locations where stormwater is discharged. Samples shall represent the quality and quantity of stormwater discharged from the facility. If a facility discharges stormwater at multiple locations, the Discharger may sample a reduced number of locations if it establishes and documents through the monitoring program that stormwater discharges from different locations are substantially identical.

(5) Records of all stormwater monitoring information and copies of all reports required by the permit shall be retained for a period of at least three years from the date of sample, observation, or report.

d. Receiving Water Monitoring

The requirements of this section only apply when the MRP requires receiving water sampling.

(1) Receiving water samples shall be collected on days coincident with effluent sampling for conventional pollutants.

(2) Receiving water samples shall be collected at each station on each sampling day during the period within one hour following low slack water. Where sampling during lower slack water is impractical, sampling shall be performed during higher slack water. Samples shall be collected within the discharge plume and down current of the discharge point so as to be representative, unless otherwise stipulated in the MRP.

(3) Samples shall be collected within one foot of the surface of the receiving water, unless otherwise stipulated in the MRP.

B. Biosolids Monitoring

This section supplements III.B of Standard Provisions (Attachment D)

When biosolids are sent to a landfill, sent to a surface disposal site, or applied to land as a soil amendment, they must be monitored as follows:

1. Biosolids Monitoring Frequency

Biosolids disposal must be monitored at the following frequency:

Metric tons biosolids/365 days	Frequency
0-290	Once per year
290-1500	Quarterly
1500-15,000	Six times per year
Over 15,000	Once per month
(Metric tons are on a dry weight basis)	

2. Biosolids Pollutants to Monitor

Biosolids shall be monitored for the following constituents:

Land Application: arsenic, cadmium, copper, mercury, molybdenum, nickel, lead, selenium, and zinc

Municipal Landfill: Paint filter test (pursuant to 40 CFR 258)

Biosolids-only Landfill or Surface Disposal Site (if no liner and leachate system): arsenic, chromium, and nickel

C. Standard Observations

This section is an addition to III of Standard Provisions (Attachment D)

1. Receiving Water Observations

The requirements of this section only apply when the MRP requires standard observations of the receiving water. Standard observations shall include the following:

a. *Floating and suspended materials* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

b. *Discoloration and turbidity*: description of color, source, and size of affected area.

c. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

d. *Beneficial water use*: presence of water-associated waterfowl or wildlife, fisherpeople, and other recreational activities in the vicinity of each sampling station.

e. *Hydrographic condition*: time and height of corrected high and low tides (corrected to nearest National Oceanic and Atmospheric Administration location for the sampling date and time of sample collection).

f. *Weather conditions*:

(1) Air temperature; and

(2) Total precipitation during the five days prior to observation.

2. Wastewater Effluent Observations

The requirements of this section only apply when the MRP requires wastewater effluent standard observations. Standard observations shall include the following:

a. *Floating and suspended material of wastewater origin* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence.

b. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

3. Beach and Shoreline Observations

The requirements of this section only apply when the MRP requires beach and shoreline standard observations. Standard observations shall include the following:

a. *Material of wastewater origin*: presence or absence, description of material, estimated size of affected area, and source.

b. *Beneficial use*: estimate number of people participating in recreational water contact, non-water contact, or fishing activities.

4. Land Retention or Disposal Area Observations

The requirements of this section only apply to facilities with on-site surface impoundments or disposal areas that are in use. This section applies to both liquid and solid wastes, whether confined or unconfined. The Discharger shall conduct the following for each impoundment:

a. Determine the amount of freeboard at the lowest point of dikes confining liquid wastes.

b. Report evidence of leaching liquid from area of confinement and estimated size of affected area. Show affected area on a sketch and volume of flow (e.g., gallons per minute [gpm]).

c. Regarding odor, describe presence or absence, characterization, source, distance of travel, and wind direction.

d. Estimate number of waterfowl and other water-associated birds in the disposal area and vicinity.

5. Periphery of Waste Treatment and/or Disposal Facilities Observations

The requirements of this section only apply when the MRP specifies periphery standard observations. Standard observations shall include the following:

a. *Odor*: presence or absence, characterization, source, and distance of travel.

b. *Weather conditions*: wind direction and estimated velocity.

IV. STANDARD PROVISIONS – RECORDS

A. Records to be Maintained

This supplements IV.A of Standard Provisions (Attachment D)

The Discharger shall maintain records in a manner and at a location (e.g., wastewater treatment plant or Discharger offices) such that the records are accessible to Regional Water Board staff. The minimum period of retention specified in Section IV, Records, of the Federal Standard Provisions shall be extended during the course of any unresolved litigation regarding the subject discharge, or when requested by the Regional Water Board or Regional Administrator of USEPA, Region IX.

A copy of the permit shall be maintained at the discharge facility and be available at all times to operating personnel.

B. Records of monitoring information shall include

This supplements IV.B of Standard Provision (Attachment D)

1. Analytical Information

Records shall include analytical method detection limits, minimum levels, reporting levels, and related quantification parameters.

2. Flow Monitoring Data

For all required flow monitoring (e.g., influent and effluent flows), the additional records shall include the following, unless otherwise stipulated by the MRP:

a. Total volume for each day; and

b. Maximum, minimum, and average daily flows for each calendar month.

3. Wastewater Treatment Process Solids

a. For each treatment unit process that involves solids removal from the wastewater stream, records shall include the following:

(1) Total volume or mass of solids removed from each collection unit (e.g., grit, skimmings, undigested biosolids, or combination) for each calendar month or other time period as appropriate, but not to exceed annually; and

(2) Final disposition of such solids (e.g., landfill, other subsequent treatment unit).

b. For final dewatered biosolids from the treatment plant as a whole, records shall include the following:

(1) Total volume or mass of dewatered biosolids for each calendar month;

(2) Solids content of the dewatered biosolids; and

(3) Final disposition of dewatered biosolids (disposal location and disposal method).

4. Disinfection Process

For the disinfection process, these additional records shall be maintained documenting process operation and performance:

a. For bacteriological analyses:

(1) Wastewater flow rate at the time of sample collection; and

(2) Required statistical parameters for cumulative bacterial values (e.g., moving median or geometric mean for the number of samples or sampling period identified in this Order).

b. For the chlorination process, when chlorine is used for disinfection, at least daily average values for the following:

(1) Chlorine residual of treated wastewater as it enters the contact basin (mg/L);

(2) Chlorine dosage (kg/day); and

(3) Dechlorination chemical dosage (kg/day).

5. Treatment Process Bypasses

A chronological log of all treatment process bypasses, including wet weather blending, shall include the following:

a. Identification of the treatment process bypassed;

b. Dates and times of bypass beginning and end;

c. Total bypass duration;

d. Estimated total bypass volume; and

e. Description of, or reference to other reports describing, the bypass event, the cause, the corrective actions taken (except for wet weather blending that is in compliance with permit conditions), and any additional monitoring conducted.

6. Treatment Facility Overflows

This section applies to records for overflows at the treatment facility. This includes the headworks and all units and appurtenances downstream. The Discharger shall retain a chronological log of overflows at the treatment facility and records supporting the information provided in section V.E.2.

C. Claims of Confidentiality – Not Supplemented

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

Not Supplemented

B. Signatory and Certification Requirements

Not Supplemented

C. Monitoring Reports

This section supplements V.C of Standard Provisions (Attachment D)

1. Self Monitoring Reports

For each reporting period established in the MRP, the Discharger shall submit an SMR to the Regional Water Board in accordance with the requirements listed in this document and at the frequency the MRP specifies. The purpose of the SMR is to document treatment performance, effluent quality, and compliance with the waste discharge requirements of this Order.

a. Transmittal letter

Each SMR shall be submitted with a transmittal letter. This letter shall include the following:

(1) Identification of all violations of effluent limits or other waste discharge requirements found during the reporting period;

(2) Details regarding violations: parameters, magnitude, test results, frequency, and dates;

(3) Causes of violations;

(4) Discussion of corrective actions taken or planned to resolve violations and prevent recurrences, and dates or time schedule of action implementation (if previous reports have been submitted that address corrective actions, reference to the earlier reports is satisfactory);

(5) Data invalidation (Data should not be submitted in an SMR if it does not meet quality assurance/quality control standards. However, if the Discharger wishes to invalidate any measurement after it was submitted in an SMR, a letter shall identify the measurement suspected to be invalid and state the Discharger's intent to submit, within 60 days, a formal request to invalidate the measurement. This request shall include the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports invalidation [e.g., laboratory sheet, log entry, test results, etc.], and discussion of the corrective actions taken or planned [with a time schedule for completion] to prevent recurrence of the sampling or measurement problem.);

(6) If the Discharger blends, the letter shall describe the duration of blending events and certify whether blended effluent was in compliance with the conditions for blending; and

(7) Signature (The transmittal letter shall be signed according to Section V.B of this Order, Attachment D – Standard Provisions.).

b. Compliance evaluation summary

Each report shall include a compliance evaluation summary. This summary shall include each parameter for which the permit specifies effluent limits, the number of samples taken during the monitoring period, and the number of samples that exceed applicable effluent limits.

c. Results of analyses and observations

(1) Tabulations of all required analyses and observations, including parameter, date, time, sample station, type of sample, test result, method detection limit, method minimum level, and method reporting level, if applicable, signed by the laboratory director or other responsible official.

(2) When determining compliance with an average monthly effluent limitation and more than one sample result is available in a month, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of detected but not quantified (DNQ) or nondetect (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

(a) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

(b) The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

If a sample result, or the arithmetic mean or median of multiple sample results, is below the reporting limit, and there is evidence that the priority pollutant is present in the effluent above an effluent limitation and the Discharger conducts a Pollutant Minimization Program, the Discharger shall not be deemed out of compliance.

(3) Dioxin-TEQ Reporting: The Discharger shall report for each dioxin and furan congener the analytical results of effluent monitoring, including the quantifiable limit (reporting level), the method detection limit, and the measured concentration. The Discharger shall report all measured values of individual congeners, including data qualifiers. When calculating dioxin-TEQ, the Discharger shall set congener concentrations below the minimum levels (ML) to zero. The Discharger shall calculate and report dioxin-TEQs using the following formula, where the MLs, toxicity equivalency factors (TEFs), and bioaccumulation equivalency factors (BEFs) are as provided in Table A:

$$\text{Dioxin-TEQ} = \Sigma\,(C_x \text{ x } TEF_x \text{ x } BEF_x)$$

where: C_x = measured or estimated concentration of congener *x*
TEF_x = toxicity equivalency factor for congener x
BEFx = bioaccumulation equivalency factor for congener *x*

Table A

Minimum Levels, Toxicity Equivalency Factors,
and Bioaccumulation Equivalency Factors

Dioxin or Furan Congener	Minimum Level (pg/L)	1998 Toxicity Equivalency Factor (TEF)	Bioaccumulation Equivalency Factor (BEF)
2,3,7,8-TCDD	10	1.0	1.0
1,2,3,7,8-PeCDD	50	1.0	0.9
1,2,3,4,7,8-HxCDD	50	0.1	0.3
1,2,3,6,7,8-HxCDD	50	0.1	0.1
1,2,3,7,8,9-HxCDD	50	0.1	0.1
1,2,3,4,6,7,8-HpCDD	50	0.01	0.05
OCDD	100	0.0001	0.01
2,3,7,8-TCDF	10	0.1	0.8
1,2,3,7,8-PeCDF	50	0.05	0.2

2,3,4,7,8-PeCDF	50	0.5	1.6
1,2,3,4,7,8-HxCDF	50	0.1	0.08
1,2,3,6,7,8-HxCDF	50	0.1	0.2
1,2,3,7,8,9-HxCDF	50	0.1	0.6
2,3,4,6,7,8-HxCDF	50	0.1	0.7
1,2,3,4,6,7,8-HpCDF	50	0.01	0.01
1,2,3,4,7,8,9-HpCDF	50	0.01	0.4
OCDF	100	0.0001	0.02

d. Data reporting for results not yet available

The Discharger shall make all reasonable efforts to obtain analytical data for required parameter sampling in a timely manner. Certain analyses require additional time to complete analytical processes and report results. For cases where required monitoring parameters require additional time to complete analytical processes and reports, and results are not available in time to be included in the SMR for the subject monitoring period, the Discharger shall describe such circumstances in the SMR and include the data for these parameters and relevant discussions of any observed exceedances in the next SMR due after the results are available.

e. Flow data

The Discharger shall provide flow data tabulation pursuant to Section IV.B.2.

f. Annual self monitoring report requirements

By the date specified in the MRP, the Discharger shall submit an annual report to the Regional Water Board covering the previous calendar year. The report shall contain the following:

(1) Annual compliance summary table of treatment plant performance, including documentation of any blending events;

(2) Comprehensive discussion of treatment plant performance and compliance with the permit (This discussion shall include any corrective actions taken or planned, such as changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve performance and reliability of the Discharger's wastewater collection, treatment, or disposal practices.);

(3) Both tabular and graphical summaries of the monitoring data for the previous year if parameters are monitored at a frequency of monthly or greater;

(4) List of approved analyses, including the following:

(a) List of analyses for which the Discharger is certified;

(b) List of analyses performed for the Discharger by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory shall not be submitted but be retained onsite); and

(c) List of "waived" analyses, as approved;

(5) Plan view drawing or map showing the Discharger's facility, flow routing, and sampling and observation station locations;

(6) Results of annual facility inspection to verify that all elements of the SWPP Plan are accurate and up to date (only required if the Discharger does not route all stormwater to the headworks of its wastewater treatment plant); and

(7) Results of facility report reviews (The Discharger shall regularly review, revise, and update, as necessary, the O&M Manual, the Contingency Plan, the Spill Prevention Plan, and Wastewater Facilities Status Report so that these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Discharger shall include, in each Annual Report, a description or summary of review and evaluation procedures, recommended or planned actions, and an estimated time schedule for implementing these actions. The Discharger shall complete changes to these documents to ensure they are up-to-date.).

g. Report submittal

The Discharger shall submit SMRs to:
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attn: NPDES Wastewater Division

h. Reporting data in electronic format

The Discharger has the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. If the Discharger chooses to submit SMRs electronically, the following shall apply:

(1) *Reporting Method*: The Discharger shall submit SMRs electronically via a process approved by the Executive Officer (see, for example, the letter dated December 17, 1999, "Official Implementation of Electronic Reporting System [ERS]" and the progress report letter dated December 17, 2000).

(2) *Monthly or Quarterly Reporting Requirements*: For each reporting period (monthly or quarterly as specified in the MRP), the Discharger shall submit an electronic SMR to the Regional Water Board in accordance with the provisions of Section V.C.1.a-e, except for requirements under Section V.C.1.c(1) where ERS does not have fields for dischargers to input certain information (e.g., sample time). However, until USEPA approves the electronic signature or other signature technologies, Dischargers that use ERS shall submit a hard copy of the original transmittal letter, an ERS printout of the data sheet, and a violation report (a receipt

of the electronic transmittal shall be retained by the Discharger). This electronic SMR submittal suffices for the signed tabulations specified under Section V.C.1.c(1).

(3) *Annual Reporting Requirements*: Dischargers who have submitted data using the ERS for at least one calendar year are exempt from submitting the portion of the annual report required under Section V.C.1.f(1) and (3).

D. Compliance Schedules

Not supplemented

E. Twenty-Four Hour Reporting

This section supplements V.E of Standard Provision (Attachment D)

1. Spill of Oil or Other Hazardous Material Reports

a. Within 24 hours of becoming aware of a spill of oil or other hazardous material that is not contained onsite and completely cleaned up, the Discharger shall report by telephone to the Regional Water Board at (510) 622-2369.

b. The Discharger shall also report such spills to the State Office of Emergency Services [telephone (800) 852-7550] only when the spills are in accordance with applicable reporting quantities for hazardous materials.

c. The Discharger shall submit a written report to the Regional Water Board within five working days following telephone notification unless directed otherwise by Regional Water Board staff. A report submitted electronically is acceptable. The written report shall include the following:

(1) Date and time of spill, and duration if known;

(2) Location of spill (street address or description of location);

(3) Nature of material spilled;

(4) Quantity of material involved;

(5) Receiving water body affected, if any;

(6) Cause of spill;

(7) Estimated size of affected area;

(8) Observed impacts to receiving waters (e.g., oil sheen, fish kill, water discoloration);

(9) Corrective actions taken to contain, minimize, or clean up the spill;

(10) Future corrective actions planned to be taken to prevent recurrence, and schedule of implementation; and

(11) Persons or agencies notified.

2. Unauthorized Discharges from Municipal Wastewater Treatment Plants[1]

The following requirements apply to municipal wastewater treatment plants that experience an unauthorized discharge at their treatment facilities and are consistent with and supercede requirements imposed on the Discharger by the Executive Officer by letter of May 1, 2008, issued pursuant to California Water Code Section 13383.

a. Two (2)-Hour Notification

For any unauthorized discharges that result in a discharge to a drainage channel or a surface water, the Discharger shall, as soon as possible, but not later than two (2) hours after becoming aware of the discharge, notify the State Office of Emergency Services (telephone 800-852-7550), the local health officers or directors of environmental health with jurisdiction over the affected water bodies, and the Regional Water Board. The notification to the Regional Water Board shall be via the Regional Water Board's online reporting system at www.wbers.net, and shall include the following:

(1) Incident description and cause;

(2) Location of threatened or involved waterway(s) or storm drains;

(3) Date and time the unauthorized discharge started;

(4) Estimated quantity and duration of the unauthorized discharge (to the extent known), and the estimated amount recovered;

(5) Level of treatment prior to discharge (e.g., raw wastewater, primary treated, undisinfected secondary treated, and so on); and

(6) Identity of the person reporting the unauthorized discharge.

b. 24-hour Certification

Within 24 hours, the Discharger shall certify to the Regional Water Board, at www.wbers.net, that the State Office of Emergency Services and the local health officers or directors of environmental health with jurisdiction over the affected water bodies have been notified of the unauthorized discharge.

c. 5-Day Written Report

Within five business days, the Discharger shall submit a written report, via the Regional Water Board's online reporting system at www.wbers.net, that includes, in addition to the information required above, the following:

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

(1) Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

(2) Efforts implemented to minimize public exposure to the unauthorized discharge;

(3) Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of water) and the extent of sampling if conducted;

(4) Corrective measures taken to minimize the impact of the unauthorized discharge;

(5) Measures to be taken to minimize the chances of a similar unauthorized discharge occurring in the future;

(6) Summary of Spill Prevention Plan or O&M Manual modifications to be made, if necessary, to minimize the chances of future unauthorized discharges; and

(7) Quantity and duration of the unauthorized discharge, and the amount recovered.

d. Communication Protocol

To clarify the multiple levels of notification, certification, and reporting, the current communication requirements for unauthorized discharges from municipal wastewater treatment plants are summarized in Table B that follows.

Table B

Summary of Communication Requirements for Unauthorized Discharges[1] from Municipal Wastewater Treatment Plants

Discharger is required to:	Agency Receiving Information	Time frame	Method for Contact
1. Notify	California Emergency Management Agency (Cal EMA)	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Telephone – (800) 852-7550 (obtain a control number from Cal EMA)
	Local health department	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Depends on local health department
	Regional Water Board	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Electronic[2] www.wbers.net
2. Certify	Regional Water Board	As soon as possible, but not later than	Electronic[3]

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

[2] In the event that the Discharger is unable to provide online notification within 2 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the notification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the notification information into the Regional Water Board's online system in electronic format.

[3] In most instances, the 2-hour notification will also satisfy 24-hour certification requirements. This is because the notification form includes fields for documenting that OES and the local health department have been contacted. In other words, if the Discharger is able

		24 hours after becoming aware of the unauthorized discharge.	www.wbers.net
3. Report	Regional Water Board	Within **5 business days** of becoming aware of the unauthorized discharge.	Electronic[4] www.wbers.net

F. Planned Changes

Not supplemented

G. Anticipated Noncompliance

Not supplemented

H. Other Noncompliance

Not supplemented

I. Other Information

Not supplemented

VI. STANDARD PROVISIONS – ENFORCEMENT

Not Supplemented

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

Not Supplemented

VIII. DEFINITIONS

This section is an addition to Standard Provisions (Attachment D)

More definitions can be found in Attachment A of this NPDES Permit.

1. Arithmetic Calculations

   a. Geometric mean is the antilog of the log mean or the back-transformed mean of the logarithmically transformed variables, which is equivalent to the multiplication of the antilogarithms. The geometric mean can be calculated with either of the following equations:

to complete all the fields in the notification form within 2 hours, certification requirements are also satisfied. In the event that the Discharger is unable to provide online certification within 24 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the certification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the certification information into the Regional Water Board's online system in electronic format.

[4] If the Discharger cannot satisfy the 5-day reporting requirements via the Regional Water Board's online reporting system, it shall submit a written report (preferably electronically in pdf) to the appropriate Regional Water Board case manager. In cases where the Discharger cannot satisfy the 5-day reporting requirements via the online reporting system, it must still complete the Regional Water Board's online reporting requirements within 15 calendar days of becoming aware of the unauthorized discharge.

$$\text{Geometric Mean} = Anti\log\left(\frac{1}{N}\sum_{i=1}^{N} Log(C_i)\right)$$

or

$$\text{Geometric Mean} = (C_1 * C_2 * \ldots * C_N)^{1/N}$$

Where "N" is the number of data points for the period analyzed and "C" is the concentration for each of the "N" data points.

b. Mass emission rate is obtained from the following calculation for any calendar day:

$$\text{Mass emission rate (lb/day)} = \frac{8.345}{N}\sum_{i=1}^{N} Q_i C_i$$

$$\text{Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of samples analyzed in any calendar day and "Q_i" and "C_i" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" grab samples that may be taken in any calendar day. If a composite sample is taken, "C_i" is the concentration measured in the composite sample and "Q_i" is the average flow rate occurring during the period over which the samples are composited. The daily concentration of a constituent measured over any calendar day shall be determined from the flow-weighted average of the same constituent in the combined waste streams as follows:

$$C_d = \text{Average daily concentration} = \frac{1}{Q_t}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of component waste streams and "Q" and "C" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" waste streams. "Q_t" is the total flow rate of the combined waste streams.

c. <u>Maximum allowable mass emission rate</u>, whether for a 24-hour, weekly 7-day, monthly 30-day, or 6-month period, is a limitation expressed as a daily rate determined with the formulas in the paragraph above, using the effluent concentration limit specified in the permit for the period and the specified allowable flow.

d. <u>POTW removal efficiency</u> is the ratio of pollutants removed by the treatment facilities to pollutants entering the treatment facilities (expressed as a percentage). The Discharger shall determine removal efficiencies using monthly averages (by calendar month unless otherwise specified) of pollutant concentration of influent and effluent samples collected at about the same time and using the following equation (or its equivalent):

Removal Efficiency (%) = 100 × [1-(Effluent Concentration/Influent Concentration)]

2. <u>Biosolids</u> means the solids, semi-liquid suspensions of solids, residues, screenings, grit, scum, and precipitates separated from or created in wastewater by the unit processes of a treatment system. It

also includes, but is not limited to, all supernatant, filtrate, centrate, decantate, and thickener overflow and underflow in the solids handling parts of the wastewater treatment system.

3. Blending is the practice of recombining wastewater that has been biologically treated with wastewater that has bypassed around biological treatment units.

4. Bottom sediment sample is (1) a separate grab sample taken at each sampling station for the determination of selected physical-chemical parameters, or (2) four grab samples collected from different locations in the immediate vicinity of a sampling station while the boat is anchored and analyzed separately for macroinvertebrates.

5. Composite sample is a sample composed of individual grab samples collected manually or by an automatic sampling device on the basis of time or flow as specified in the MRP. For flow-based composites, the proportion of each grab sample included in the composite sample shall be within plus or minus five percent (+/-5%) of the representative flow rate of the waste stream being measured at the time of grab sample collection. Alternatively, equal volume grab samples may be individually analyzed with the flow-weighted average calculated by averaging flow-weighted ratios of each grab sample analytical result. Grab samples comprising time-based composite samples shall be collected at intervals not greater than those specified in the MRP. The quantity of each grab sample comprising a time-based composite sample shall be a set of flow proportional volumes as specified in the MRP. If a particular time-based or flow-based composite sampling protocol is not specified in the MRP, the Discharger shall determine and implement the most representative sampling protocol for the given parameter subject to Executive Officer approval.

6. Depth-integrated sample is defined as a water or waste sample collected by allowing a sampling device to fill during a vertical traverse in the waste or receiving water body being sampled. The Discharger shall collect depth-integrated samples in such a manner that the collected sample will be representative of the waste or water body at that sampling point.

7. Flow sample is an accurate measurement of the average daily flow volume using a properly calibrated and maintained flow measuring device.

8. Grab sample is an individual sample collected in a short period of time not exceeding 15 minutes. Grab samples represent only the condition that exists at the time the wastewater is collected.

9. Initial dilution is the process that results in the rapid and irreversible turbulent mixing of wastewater with receiving water around the point of discharge.

10. Overflow is the intentional or unintentional spilling or forcing out of untreated or partially treated wastes from a transport system (e.g., through manholes, at pump stations, and at collection points) upstream from the treatment plant headworks or from any part of a treatment plant facility.

11. Priority pollutants are those constituents referred to in 40 CFR Part 122 as promulgated in the Federal Register, Vol. 65, No. 97, Thursday, May 18, 2000, also known as the California Toxics Rule, the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses.

12. Stormwater means stormwater runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

13. Toxic pollutant means any pollutant listed as toxic under federal Clean Water Act section 307(a)(1) or under 40 CFR 401.15.

14. Untreated waste is raw wastewater.

15, Waste, waste discharge, discharge of waste, and discharge are used interchangeably in the permit. The requirements of the permit apply to the entire volume of water, and the material therein, that is disposed of to surface and ground waters of the State of California.

Table C

List of Monitoring Parameters and Analytical Methods

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
1.	Antimony	204.2					10	5	50	0.5	5	0.5		1000
2.	Arsenic	206.3				20		2	10	2	2	1		1000
3.	Beryllium						20	0.5	2	0.5	1			1000
4.	Cadmium	200 or 213					10	0.5	10	0.25	0.5			1000
5a.	Chromium (III)	SM 3500												
5b.	Chromium (VI)	SM 3500				10	5							1000
	Chromium (total)[7]	SM 3500					50	2	10	0.5	1			1000
6.	Copper	200.9					25	5	10	0.5	2			1000
7.	Lead	200.9					20	5	5	0.5	2			10,000
8.	Mercury	1631 (note)[8]												
9.	Nickel	249.2					50	5	20	1	5			1000
10.	Selenium	200.8 or SM 3114B or C						5	10	2	5	1		1000
11.	Silver	272.2					10	1	10	0.25	2			1000
12.	Thallium	279.2					10	2	10	1	5			1000
13.	Zinc	200 or 289					20		20	1	10			
14.	Cyanide	SM 4500 CN^- C or I				5								
15.	Asbestos (only required for dischargers to MUN waters)[9]	0100.2 [10]												

[5] The suggested method is the USEPA Method unless otherwise specified (SM = Standard Methods). The Discharger may use another USEPA-approved or recognized method if that method has a level of quantification below the applicable water quality objective. Where no method is suggested, the Discharger has the discretion to use any standard method.

[6] Minimum levels are from the *State Implementation Policy*. They are the concentration of the lowest calibration standard for that technique based on a survey of contract laboratories. Laboratory techniques are defined as follows: GC = Gas Chromatography; GCMS = Gas Chromatography/Mass Spectrometry; LC = High Pressure Liquid Chromatography; Color = Colorimetric; FAA = Flame Atomic Absorption; GFAA = Graphite Furnace Atomic Absorption; ICP = Inductively Coupled Plasma; ICPMS = Inductively Coupled Plasma/Mass Spectrometry; SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., USEPA 200.9); Hydride = Gaseous Hydride Atomic Absorption; CVAA = Cold Vapor Atomic Absorption; DCP = Direct Current Plasma.

[7] Analysis for total chromium may be substituted for analysis of chromium (III) and chromium (VI) if the concentration measured is below the lowest hexavalent chromium criterion (11 ug/l).

[8] The Discharger shall use ultra-clean sampling (USEPA Method 1669) and ultra-clean analytical methods (USEPA Method 1631) for mercury monitoring. The minimum level for mercury is 2 ng/l (or 0.002 ug/l).

[9] MUN = Municipal and Domestic Supply. This designation, if applicable, is in the Findings of the permit.

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
16.	2,3,7,8-TCDD and 17 congeners (Dioxin)	1613												
17.	Acrolein	603	2.0	5										
18.	Acrylonitrile	603	2.0	2										
19.	Benzene	602	0.5	2										
33.	Ethylbenzene	602	0.5	2										
39.	Toluene	602	0.5	2										
20.	Bromoform	601	0.5	2										
21.	Carbon Tetrachloride	601	0.5	2										
22.	Chlorobenzene	601	0.5	2										
23.	Chlorodibromomethane	601	0.5	2										
24.	Chloroethane	601	0.5	2										
25.	2-Chloroethylvinyl Ether	601	1	1										
26.	Chloroform	601	0.5	2										
75.	1,2-Dichlorobenzene	601	0.5	2										
76.	1,3-Dichlorobenzene	601	0.5	2										
77.	1,4-Dichlorobenzene	601	0.5	2										
27.	Dichlorobromomethane	601	0.5	2										
28.	1,1-Dichloroethane	601	0.5	1										
29.	1,2-Dichloroethane	601	0.5	2										
30.	1,1-Dichloroethylene or 1,1-Dichloroethene	601	0.5	2										
31.	1,2-Dichloropropane	601	0.5	1										
32.	1,3-Dichloropropylene or 1,3-Dichloropropene	601	0.5	2										
34.	Methyl Bromide or Bromomethane	601	1.0	2										
35.	Methyl Chloride or Chloromethane	601	0.5	2										
36.	Methylene Chloride or Dichlorormethane	601	0.5	2										
37.	1,1,2,2-Tetrachloroethane	601	0.5	1										
38.	Tetrachloroethylene	601	0.5	2										
40.	1,2-Trans-Dichloroethylene	601	0.5	1										
41.	1,1,1-Trichloroethane	601	0.5	2										
42.	1,1,2-Trichloroethane	601	0.5	2										
43.	Trichloroethene	601	0.5	2										
44.	Vinyl Chloride	601	0.5	2										
45.	2-Chlorophenol	604	2	5										
46.	2,4-Dichlorophenol	604	1	5										
47.	2,4-Dimethylphenol	604	1	2										
48.	2-Methyl-4,6-Dinitrophenol or Dinitro-2-methylphenol	604	10	5										
49.	2,4-Dinitrophenol	604	5	5										
50.	2-Nitrophenol	604		10										

[10] Determination of Asbestos Structures over 10 [micrometers] in Length in Drinking Water Using MCE Filters, USEPA 600/R-94-134, June 1994.

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
51.	4-Nitrophenol	604	5	10										
52.	3-Methyl-4-Chlorophenol	604	5	1										
53.	Pentachlorophenol	604	1	5										
54.	Phenol	604	1	1		50								
55.	2,4,6-Trichlorophenol	604	10	10										
56.	Acenaphthene	610 HPLC	1	1	0.5									
57.	Acenaphthylene	610 HPLC		10	0.2									
58.	Anthracene	610 HPLC		10	2									
60.	Benzo(a)Anthracene or 1,2 Benzanthracene	610 HPLC	10	5										
61.	Benzo(a)Pyrene	610 HPLC		10	2									
62.	Benzo(b)Fluoranthene or 3,4 Benzofluoranthene	610 HPLC		10	10									
63.	Benzo(ghi)Perylene	610 HPLC		5	0.1									
64.	Benzo(k)Fluoranthene	610 HPLC		10	2									
74.	Dibenzo(a,h)Anthracene	610 HPLC		10	0.1									
86.	Fluoranthene	610 HPLC	10	1	0.05									
87.	Fluorene	610 HPLC		10	0.1									
92.	Indeno(1,2,3-cd) Pyrene	610 HPLC		10	0.05									
100.	Pyrene	610 HPLC		10	0.05									
68.	Bis(2-Ethylhexyl)Phthalate	606 or 625	10	5										
70.	Butylbenzyl Phthalate	606 or 625	10	10										
79.	Diethyl Phthalate	606 or 625	10	2										
80.	Dimethyl Phthalate	606 or 625	10	2										
81.	Di-n-Butyl Phthalate	606 or 625		10										
84.	Di-n-Octyl Phthalate	606 or 625		10										
59.	Benzidine	625		5										
65.	Bis(2-Chloroethoxy)Methane	625		5										
66.	Bis(2-Chloroethyl)Ether	625	10	1										
67.	Bis(2-Chloroisopropyl)Ether	625	10	2										
69.	4-Bromophenyl Phenyl Ether	625	10	5										
71.	2-Chloronaphthalene	625		10										
72.	4-Chlorophenyl Phenyl Ether	625		5										
73.	Chrysene	625		10	5									
78.	3,3'-Dichlorobenzidine	625		5										
82.	2,4-Dinitrotoluene	625	10	5										
83.	2,6-Dinitrotoluene	625		5										
85.	1,2-Diphenylhydrazine (note)[11]	625		1										
88.	Hexachlorobenzene	625	5	1										
89.	Hexachlorobutadiene	625	5	1										
90.	Hexachlorocyclopentadiene	625	5	5										
91.	Hexachloroethane	625	5	1										
93.	Isophorone	625	10	1										
94.	Naphthalene	625	10	1	0.2									

[11] Measurement for 1,2-Diphenylhydrazine may use azobenzene as a screen: if azobenzene is measured at >1 ug/l, then the Discharger shall analyze for 1,2-Diphenylhydrazine.

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
95.	Nitrobenzene	625	10	1										
96.	N-Nitrosodimethylamine	625	10	5										
97.	N-Nitrosodi-n-Propylamine	625	10	5										
98.	N-Nitrosodiphenylamine	625	10	1										
99.	Phenanthrene	625		5	0.05									
101.	1,2,4-Trichlorobenzene	625	1	5										
102.	Aldrin	608	0.005											
103.	α-BHC	608	0.01											
104.	β-BHC	608	0.005											
105.	γ-BHC (Lindane)	608	0.02											
106.	δ-BHC	608	0.005											
107.	Chlordane	608	0.1											
108.	4,4'-DDT	608	0.01											
109.	4,4'-DDE	608	0.05											
110.	4,4'-DDD	608	0.05											
111.	Dieldrin	608	0.01											
112.	Endosulfan (alpha)	608	0.02											
113.	Endosulfan (beta)	608	0.01											
114.	Endosulfan Sulfate	608	0.05											
115.	Endrin	608	0.01											
116.	Endrin Aldehyde	608	0.01											
117.	Heptachlor	608	0.01											
118.	Heptachlor Epoxide	608	0.01											
119-125	PCBs: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260	608	0.5											
126.	Toxaphene	608	0.5											

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2012-0015

SITE CLEANUP REQUIREMENTS

FOR

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Regional Water Board, finds that:

SITE DESCRIPTION

1. Chevron Products Company, a subsidiary of Chevron USA, Inc. (hereinafter called Chevron or the Discharger), owns and operates the Chevron Richmond Refinery (hereinafter called the refinery). The refinery was built in 1902 and produces a broad range of fuels, lubricants, asphalt and petrochemicals. The 2,900-acre refinery is located along the southern shore of San Pablo Bay in Contra Costa County (Figure 1). The City of Richmond lies to the east of the refinery. To the east and within one mile from the facility are industrial, residential, and commercial land uses.

PURPOSE OF ORDER

2. Pursuant to California Water Code (CWC) section 13304, the Site Cleanup Requirements (SCR) in this Order require site investigations be made and continued monitoring of corrective action measures implemented at specified areas of the refinery. This Order requires the Discharger to:
   - Ensure that the remediation systems and respective monitoring programs are operated, evaluated and modified as necessary to ensure the requirements of this Order are met.
   - Continue to evaluate the performance of implemented corrective actions at Pollard Pond, the 250-Foot Channel, S.P. Hill, and the site-wide groundwater control system and hydrocarbon recovery program.

REGULATORY HISTORY

3. On June 16, 2011, the Regional Water Board adopted Updated Waste Discharge Requirements (WDRs) Order No. R2-2011-0036, which specified requirements for continued maintenance and monitoring of inactive and closed waste management units along with requirements for waste management unit corrective action and water quality monitoring programs. This Order shares the same Self-Monitoring and Reporting Program with Order No. R2-2011-0036. Prior to these two orders, the Regional Water Board regulated refinery-wide investigations and corrective action activities under Waste Discharge Requirements Order No. 00-043.

   Other orders previously adopted for the refinery are:

   93-109 Waste Discharge Requirements
   93-016 Site Cleanup Requirements for the S.P. Hill Tankfield
   92-092 Site Cleanup Requirements for the Alkane Sector
   92-010 Waste Discharge Requirements for Landfill 15
   91-098 Cease and Desist Order for Pollard Pond and the Hydropits
   90-146 Site Cleanup Requirements for Plant l/Additives Plant
   89-175 Waste Discharge Requirements

89-011 Cease and Desist Order for the Pollard Pond
88-044 Waste Discharge Requirements
83-13 Waste Discharge Requirements
81-55 Waste Discharge Requirements

4. The Regional Water Board adopted Order No. R2-2011-0049 (NPDES No. CA0005134) on July 13, 2011. This permit regulates the discharge of effluent from the Discharger's wastewater treatment system and the discharges of all stormwater associated with industrial activity from the refinery to San Pablo and San Francisco bays.

FACILITY DESCRIPTION AND HISTORY

Hydrogeologic Setting

5. The refinery and its tankfields are located on the peninsula of the Potrero-San Pablo Ridge, which is composed of the steeply dipping Franciscan Complex. The refining of petroleum products generally occurs on the bay fill areas northeast of the ridge. The southwest side of the ridge consists of steep topography where the Franciscan Complex has been terraced for the placement of aboveground petroleum storage tanks.

6. Past fluctuations in Quaternary sea levels created a complex sedimentary sequence of interfingered estuarine and alluvial fan deposits overlying the Franciscan Complex bedrock. The uppermost deposits are artificially placed bay fill, ranging from approximately 3 feet to approximately 30 feet in depth. The fill materials overlie Bay Muds, which consist of silt and silty clay with abundant plant matter or peat. The Bay Muds overlap onto the Franciscan Complex bedrock and thicken bayward.

7. Three hydrogeologic zones have been identified within the top 150 feet of sediments in the flat lying areas of the refinery, the A-Zone, the C-Zone, and the B-Zone, in order of increasing depth:

   a. The A-Zone is the first water-bearing zone and consists of artificial fill and the naturally occurring peat rich, Bay Mud. The water table elevation for this zone is within 2 to 10 feet of the ground surface and generally discharges to the Bay.

   b. The C-Zone is an 80 to 90-foot-thick water-bearing zone of interfingered alluvial and estuarine sediments. These sediments generally have low hydraulic conductivity, but sandy, more permeable units occur as channels and lenses. The sand units have not been shown to be contiguous across the site but do appear to be hydraulically connected. However, based on several years of chemical data, there is no indication that the C-Zone groundwater has been significantly impacted. Chevron has concluded that the Bay Mud has been an effective hydraulic barrier between the A- and C-zones and has prevented the migration of contaminants in groundwater from the A-Zone to the C-Zone. These results and conclusions were presented to the Regional Water Board in two reports titled C-Zone Investigation - Phase 1 and Phase 2, dated February 8, and December 20, 1991, respectively and continue to be supported by groundwater monitoring data collected pursuant to the refinery-wide Self-Monitoring Program.

c. The B-Zone is a relatively permeable unit at approximately 100 feet below the ground surface. It ranges from 5 to 15 feet thick and contains potable water but has limited production capacity. The B-Zone occurs under artesian conditions and appears to be hydraulically separate from the overlying zones.

8. As shown in Figure 2, the refinery lies in four geomorphic/geologic settings referred to locally as the "Alluvial," "Flats," "Ridge," and "Transition" zones:

   a. The **Alluvial Zone** is defined as the broad area of alluvial fan deposits, derived from the Berkeley Hills, east of the refinery. This zone represents flatland areas in which Bay Mud was not deposited. The upper portion of the alluvial fan deposit is typically clayey with low permeability, except where sandy or silty levee deposits are present and provide conduits for groundwater flow.

   b. The **Flats Zone** comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of Potrero-San Pablo Ridge. For the purpose of the refinery's investigations, the inland Flats Zone/Alluvial Zone boundary has been defined to be the 5-foot Bay Mud isopach (line of equal thickness). Thus, the Flats Zone is typically underlain by at least five feet of Bay Mud except where removed by excavation or erosion, in local areas of non-deposition, or where displaced by differential settlement of overlying fill.

   c. The **Ridge Zone** consists primarily of colluvium (slope wash) overlying deformed Franciscan Complex rocks exposed along Potrero-San Pablo Ridge. The lower boundary of the Ridge Zone is the 50-foot elevation contour.

   d. The **Transition Zone** is defined as the area that separates the Flats Zone from the Ridge Zone. As described above, the Flats-Transition boundary is defined as the area between the 5-foot Bay Mud isopach and the 50-foot elevation contour.

9. Chevron has subdivided the refinery into ten geographic sectors (see Figure 3). Each sector has unique hydrogeology and varying degrees of environmental concern. The sectors are as follows:

   - Landfarms/Landfill 15
   - Castro/Plant 1/Additives
   - North Yard
   - Bayside Sector – North
   - Bayside Sector - South
   - Alkane Sector
   - Effluent
   - Reclamation
   - Pollard
   - Interior “C” Zone or Main Yard

10. Sector boundaries are generally defined by a physiographic boundary separating adjacent sectors or by the refinery property line. The upgradient sector boundaries for the Alkane, North Yard, and Main Yard sectors correspond to an inferred groundwater drainage divide, which is generally coincident with topographic drainage divides along San Pablo Ridge. The upgradient sector boundaries for the Landfarms/Landfills, Castro, and Reclamation sectors are generally coincident with the refinery property line. The Bayside sectors (North and South) include all Chevron properties on the southwestern side of San Pablo Ridge and adjacent to San Francisco Bay. With the exception of the Bayside sectors, all sites described in this Order are largely contained by the groundwater protection systems, which are described below.

Corrective Action

11. All sectors have impacted soil and/or groundwater from historic releases, and corrective action steps have been implemented. Some of the sectors contain Waste Management Units that are either in the Title 27 Corrective Action Monitoring Program or part of the refinery effluent system; these include the Alkane, Reclamation, North Yard, Effluent, and Landfarms/Landfill sectors. These sectors are regulated by Waste Discharge Requirements Order No. R2-2011-0036. Corrective action occurring at sectors comprised of only impacted soil and/or groundwater from historic releases and not associated with Waste Management Units will be addressed in this Order; these include the Pollard, Castro/Plant 1 Additives, Bayside North, Bayside South and Interior “C” Zone sectors.

12. Chevron has implemented corrective actions to intercept contaminated groundwater at various locations and thus to prevent migration to San Pablo Bay. The corrective actions include systems comprised of varying combinations of slurry walls, extraction trenches and/or extraction wells for hydraulic control at different locations within the refinery. The systems comprised of slurry walls and/or extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and the Castro/Plant 1 sectors are referred to collectively as the Groundwater Protection Systems (GPS) (see Figure 4). The GPS establishes and maintains a contiguous capture zone which prevents migration of potentially contaminated “A” Zone groundwater past the GPS alignment. The slurry walls were installed where thick and/or highly permeable intervals of “A” Zone fill soils are encountered and were keyed into the underlying Bay Mud unit. The low permeability Bay Mud unit separates contamination in the “A” Zone from the underlying “C” Zone in the "Flats Zone" of the refinery (see Figure 13).

13. Approximately 24,700 feet of extraction trench, 18,535 feet of barrier wall, over 200 groundwater extraction sumps, and one groundwater treatment plant have been installed. The extracted groundwater is routed to the refinery's effluent treatment system and discharged in accordance with existing NPDES permit requirements cited in Finding 4. The GPS extraction trench and barrier wall are illustrated in Figure 13.

14. The Regional Water Board has determined that the GPS comprised of the slurry walls and extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and Castro/Plant 1 sectors is a satisfactory corrective action measure for the containment and removal of contaminated groundwater along the perimeter of the refinery. The corrective action at the Alkane, North Yard, Effluent, Landfarms/Landfill, and Reclamation

sectors are addressed by Waste Discharge Requirements Order No. R2-2011-0036. Activities associated with the Castro/Plant 1 Additives, Pollard, Bayside North, Bayside South and Interior C Zone sectors are addressed in this SCR. There is a single groundwater monitoring program for all sectors, which is contained in both the WDRs and this SCR.

15. The refinery reports the following GPS performance by sector, as of the beginning of 2011. All portions of the GPS are currently performing as intended:

    Alkane: A continuous hydraulic depression, which indicates that contaminated groundwater is captured prior to offsite discharge, was present along the Alkane GPS, with an average flowrate of 30,000 gallons per day of groundwater.

    Landfill 15: A continuous hydraulic depression was present along the Landfill 15 GPS, with an average flowrate of 36,400 gallons per day of groundwater.

    Landfarms 2 and 5: A continuous hydraulic depression was present along the GPS alignments to the west of Landfarms 2 and 5, with an average flowrate of 16,600 gallons per day of groundwater extracted.

    Landfarms 2 and 3: A continuous hydraulic depression was present along the GPS alignment north of Landfarms 2 and 3, with an average flowrate of 22,600 gallons per day of groundwater extracted.

    North Yard: A continuous hydraulic depression was present along the North Yard GPS, with an average flowrate of 52,000 gallons per day of groundwater.

    Landfarm 1: A continuous hydraulic depression was present along the GPS alignments downgradient of Landfarm 1, with an average flowrate of 50,100 gallons per day of groundwater extracted.

    Castro and Plant 1 Additives: A continuous hydraulic depression was present along the southern alignment of the Castro GPS, with an average flowrate of 26,400 gallons per day of groundwater extracted.

    Reclamation Yard: A hydraulic depression or drawdown was generally present, with an average flowrate of 67,200 gallons per day of groundwater extracted.

    Pollard: An inward hydraulic gradient was present along the edge of the former Pollard Landfill, with an average flowrate of 1100 gallons per day of groundwater extracted.

Summary of Previous Cleanup Actions

16. The following is a summary of corrective actions taken pursuant to previous Regional Water Board orders. All of the previous orders have been rescinded and any remaining open items incorporated into this site-wide order.

17. 250-foot Channel: The channel was excavated between 1900 and 1920 and comprised the original ship channel for the refinery until the 1950's. The channel was then dammed and used as part of the effluent treatment system until 1987 and now serves to store stormwater and treated process water. In 2002, interim corrective actions were required by Order No. 00-043 for the petroleum hydrocarbon contaminated soil contained in the channel. These included installation of a HDPE barrier, fencing, bank steepening, vegetation control and removal of perching objects used by birds. They also included continued collection and removal of oil, vegetation management and wildlife surveys, and water elevation monitoring to assure that there is neither a vertical or lateral gradient allowing for the release of contaminated water to either groundwater outside of the GPS or the Bay. Ongoing monitoring performed in accordance with the *Corrective Action Plan for the 250-Foot Channel* (Chevron, 2002) indicates limited wildlife exposure. Additionally the "A" Zone groundwater flow is fully contained by the GPS, and there is largely an upward vertical hydraulic gradient flow into the channel from the "C" Zone aquifer.

18. Castro/Plant l Additives Plant: Between 1930 and 1970 the Plant 1 Additives Plant was used for formulating and packaging pesticides as well as manufacturing gasoline additives. As a result, soil is contaminated with pesticides, lead and petroleum hydrocarbons. Hazardous levels of chlordane, DDT and soluble lead have been detected in onsite soil. Corrective action completed pursuant to Order No. 91-046 included: installation of an extraction system for containment of contaminated shallow groundwater (GPS), covering a portion of the site with the Richmond Parkway, and placement of a geotextile and asphalt cap (or vegetated fill in some areas) over the non-roadway portions. The combined cover provides a low-permeability cap over the site, and the encompassing groundwater extraction system prevents contaminated shallow groundwater from leaving the site. No further closure activities are necessary or required for the Plant l/Additives Plant, but there is ongoing groundwater monitoring as part of the attached monitoring program.

19. Pollard Pond and the Hydrolyzing Pits: The Toxic Pits Cleanup Act (TPCA) required the closure of hazardous waste surface impoundments in two areas of the refinery, under schedules provided in Order No. 91-098. The first impoundment, known as Pollard Pond, was a 3-acre surface impoundment located in the northwestern portion of the refinery (Figure 6) adjacent to San Pablo Bay that contained sludges with a pH less than 2 and Bay Mud dredge spoils from the refinery yacht harbor.

    Closure activities included excavation and removal of soil contaminated with petroleum hydrocarbons and low-pH hazardous wastes, installation of a GPS groundwater extraction trench at the downgradient boundary of the pond, dismantling of Pollard Dam, and confirmation sampling of soil from the bottom of the former surface impoundment or pond. The remaining 30,000 cubic yards of non-hazardous hydrocarbon contaminated were removed from the site and placed in Landfill 15. Following the clean closure, groundwater in several wells continued to have low pH and elevated concentrations of nickel and zinc. In November and December 2008, Chevron injected 263,000 gallons of calcium polysulfide into 18 boreholes in an attempt to neutralize the remaining soil contamination. Measurable changes to the pH occurred during injection; however, the effects were short-lived and groundwater conditions have returned to

historic low pH levels. Task 15 of this Order requires Chevron to submit remedial plans for additional corrective action at Pollard Pond.

Three additional small unlined surface impoundments, known as the Hydrolyzing Pits (Hydropits), were located along the shore of San Pablo Bay in the Alkane Sector (Figure 7). These pits also received wastewater from the refinery's Alkane Plant until 1986. The most significant constituents of this waste stream were neutralized hydrofluoric acid, fluoride salts, and small amounts of oil containing benzene. Closure involved placing a multi-layer cap and installing the Alkane GPS along the northeastern perimeter of the Hydropits adjacent to Castro Cove. No further closure activities are necessary or required for the Hydropits.

20. Alkane Plant Plume Remediation: Corrective action was required by Order No. 92-092 for shallow groundwater plumes containing benzene, hydrofluoric acid, and free-phase petroleum hydrocarbons, in addition to implementation of the GPS to hydraulically contain shallow contaminated groundwater. Chevron operates eight recovery wells to recover floating liquid hydrocarbons and contaminated groundwater. These recovery wells make up the Alkane Plant Groundwater Recovery System. Groundwater and liquid hydrocarbons recovered by the extraction wells are routed to the refinery's effluent treatment system and discharged in accordance with existing NPDES permit requirements. There is ongoing groundwater monitoring as part of the attached monitoring program.

21. Bayside South/S.P. Hill Tankfield: Corrective action required by Order No. 93-016 consists of the cleanup of contaminated groundwater and removal of free-phase liquid petroleum hydrocarbons under the S.P. Hill Tankfield. Free-phase petroleum hydrocarbons were discovered in 5 wells located in the central portion of the tankfield within a 250-foot radius of each other. Chevron has been recovering free product and some incidental groundwater from these wells since 1994. Free product recovery rates are generally less than one gallon per day. The primary cleanup objective is to recover as much free-phase hydrocarbon product as is technically feasible and cost-effective. Chevron also operates additional extraction wells in basins 4 and 7 to create a hydraulic depression and to capture dissolved petroleum hydrocarbon constituents in groundwater several hundred feet downgradient of the free product recovery system.

22. Bayside North/Point Orient Tankfield: In 1990, aboveground petroleum storage tanks in the Point Orient Tankfield were taken out of service and dismantled, and contaminated soils were removed. There was no evidence of an accumulation of free-phase hydrocarbons on the water table along the perimeter of the tankfield; however, hydrocarbon-contaminated soil was observed beneath the former tanks. Chevron submitted a hydrogeologic investigation for this tankfield on June 23, 1992, which determined that minor soil and groundwater contamination exists at the No.10 Basin. Groundwater monitoring in this area is ongoing.

23. Salt Water Pump Station: In 1998, hydrocarbon sheen was observed on the Bay near the intake of the former Salt Water Pump Station. The source is believed to be from historic pipeline leaks from an adjacent pipeway. In 1999, a soil bentonite barrier was built, and two monitoring wells were installed. Chevron continues visual inspections of the shoreline and monitors the two wells for free product as part of the attached monitoring program. Minor amounts of free product are

occasionally observed in these wells. In May 2011, 0.07 feet of free product were observed in well 668AT, but none was observed in the most recent monitoring report.

MONITORING PROGRAMS

24. To record the compliance of the corrective actions described above, Chevron is required to implement the attached monitoring program described in these Site Cleanup Requirements.

25. Pursuant to a plan approved by the Regional Water Board in 2002, the *Statistical Evaluation Plan for the Landfarm Area, Groundwater Self-Monitoring and Reporting Program, Order No. 00-043*, (URS, 2002), Chevron performs a statistical evaluation and trend analysis of groundwater analytical results obtained from monitoring wells, to assess the effectiveness of the remedial actions at the refinery.

26. Chevron also reports on groundwater elevations, flow patterns and velocities, hydrocarbon thicknesses and recovery, and closure unit monitoring, inspection and maintenance activities as part of its monitoring program.

BASIN PLAN

27. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law and U.S. EPA, where required.

28. State Water Board Resolution No. 68-16: State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharger and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background shall be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives.

29. State Water Board Resolution No. 92-49: State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under California Water Code Section 13304," establishes policies and procedures to be used by the Board when:

- Determining when a person is required to investigate, cleanup, or abate a discharge;
- Concurring with a discharger's selection of cost-effective investigation and remedial measures;
- Overseeing implementation of investigation and remedial measures; and
- Determining schedules for investigation and remedial measures.

30. State Water Board Resolution No. 88-63: The Basin Plan provides that all groundwaters are considered suitable, or potentially suitable, for municipal or domestic water supply (MUN) and that, in making any exceptions, the Regional Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63, "Sources of Drinking Water", where:

    i) The total dissolved solids exceed 3,000 mg/l (5,000 µS/cm, electrical conductivity), and it is not reasonably expected by the Regional Water Board that the groundwater could supply a public water system, or

    ii) There is contamination, either by natural processes or human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using best management practices or best economically achievable treatment practices, or

    iii) The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

31. Basis for California Water Code Section 13304 Order: The Discharger has caused or permitted, causes or permits, or threatens to cause or permit waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of contamination or nuisance.

BENEFICIAL USES

32. Shallow groundwater beneath the "Flats Zone", which comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of the Potrero-San Pablo Ridge, has Total Dissolved Solids (TDS) significantly higher than the 3000 mg/l (5000 µS/cm electrical conductivity) level that State Water Board Resolution No. 88-63 set as a maximum for a municipal or domestic water supply in the Sources of Drinking Water Policy. There is no historical, existing or planned use of groundwater as a source of drinking water in either the shallow (A- and C-Zone) or deeper (B-Zone) aquifers in this part of the refinery.

    Groundwater beneath the "Ridge Zone," which is bounded on the south by San Francisco Bay and extends northwest up to the top of the Potrero-San Pablo Ridge (Bayside sectors), is primarily contained in fractured bedrock of the Franciscan Complex. Based on aquifer test data collected during hydrogeologic investigations of the tankfields in the Bayside North and Bayside South sectors, it is unlikely that a single well could produce an average sustained yield of 200 gallons per day for drinking water supply purposes (State Water Board Resolution No. 88-63, exemption criterion 1(c) and Regional Water Board Resolution No. 89-39). There is no historical, existing or planned use of unconfined groundwater as a source of drinking water in this part of the refinery.

    There is the potential, however, for groundwater on either side of the Potrero-San Pablo Ridge to discharge into San Francisco and San Pablo bays at the shoreline groundwater/surface water interface. Therefore, the surface water beneficial uses named in the Basin Plan for these bodies of water are applicable to groundwater in point-of compliance monitoring wells near the shoreline interface.

33. The existing and potential beneficial uses of groundwater underlying the site that is not contained in bedrock and is greater than 100 feet below ground surface are:

    a. Industrial process and service supply
    b. Agricultural water supply
    c. Municipal and domestic supply
       (however due to the proximity of the Bay, groundwater at the site contains elevated TDS levels, which render the groundwater nonpotable).

34. The existing and potential beneficial uses of San Francisco and San Pablo bays are:

    a. Ocean, commercial, and sport fishing
    b. Shellfish harvesting
    c. Estuarine habitat
    d. Fish migration
    e. Preservation of rare and endangered species
    f. Fish spawning
    g. Wildlife habitat
    h. Water contact recreation
    i. Non-contact water recreation
    j. Industrial service supply
    k. Industrial process supply
    l. Navigation

CALIFORNIA ENVIRONMENTAL QUALITY ACT

35. This site has previously been subject to cleanup requirements under Regional Water Board Order Nos. 93-016, 92-092, and 90-146. This Order only requires that the requirements first imposed by these previous orders be continued. Continuing activities previously imposed do not have the potential for significant impacts on the environment. As such, the general rule that the California Environmental Quality Act (CEQA) only applies to projects that have the potential for causing a significant effect on the environment (the "common sense" exemption) applies, and no environmental document needs to be prepared in connection with the adoption of this Order. [Cal. Code Regs., tit. 14, § 15061(b)(3)] Furthermore, this Order does not approve any specific cleanup plan beyond those already imposed by the previous orders, and it is generally the first imposition of a cleanup plan that might result in impacts to the environment. This further supports the application of the "common sense" exemption for adoption of this Order. When a specific cleanup proposal is submitted to the Executive Officer for approval, such proposal must and will be evaluated under CEQA prior to approval.

NOTICE AND MEETING

36. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to issue Site Cleanup Requirements and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

37. The Regional Water Board, at a public meeting, heard and considered all comments pertaining to this issuance of Site Cleanup Requirements.

IT IS HEREBY ORDERED, pursuant to section 13304 of the California Water Code, that the Discharger (or its agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner that will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.

2. Migration of pollutants through subsurface transport to waters of the State outside of the GPS is prohibited**.**

3. There shall be no discharge of wastes or hazardous substances to surface waters except as permitted under the refinery's current NPDES Permit.

4. Activities associated with the subsurface investigation and cleanup that will cause significant adverse migration of wastes or hazardous substances are prohibited.

5. The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code section 13050(m).

6. The Discharger shall not cause the following conditions to exist in waters of the State at any place outside of the GPS:

   a. <u>Surface Waters</u>

      i. Floating, suspended, or deposited macroscopic particulate matter or foam;
      ii. Bottom deposits or aquatic growth;
      iii. Adversely altered temperature, turbidity, or apparent color beyond natural background levels;
      iv. Visible, floating, suspended or deposited oil or other products of petroleum origin; or
      v. Toxic or other deleterious substances to be present in concentrations or quantities that may cause deleterious effects on aquatic biota, wildlife or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

   b. <u>Groundwater</u>

      i. Further degradation of groundwater quality and/or substantial worsening of existing groundwater impacts; and
      ii. Subsurface migration of pollutants associated with Chevron's operations to waters of the State is prohibited.

TASKS

ALL REQUIRED SUBMITTALS MUST BE ACCEPTABLE TO THE EXECUTIVE OFFICER (SEE PROVISION NO. 1 *COMPLIANCE*)

GPS Requirements

1. Chevron shall continue to extract water from the Groundwater Protection System (GPS) at a rate which eliminates or reverses the bayward migration of contaminants in the uppermost water-bearing zone (the A Zone). Chevron shall also operate the GPS so as to prevent significant threats to the second water-bearing zone (the C Zone). Chevron shall install, if practicable, a physical barrier downgradient of any extraction well(s) or extraction trenches that are producing Bay water at volumes deemed to be unacceptable by the Executive Officer.

   COMPLIANCE DATE: Immediately.

Hydraulic Containment

2. Chevron shall continue to monitor the "A Zone" for contaminants on the downgradient side of the GPS trench/barrier and groundwater levels on both sides of the GPS trench/barrier for the primary purpose of evaluating the effectiveness of the GPS. Chevron shall demonstrate compliance with Task 1 above by submitting, pursuant to the Self-Monitoring and Reporting Program of Order No. R2-2011-0036 attached to this Order, potentiometric water elevation contour maps which graphically demonstrate maintenance of an inward hydraulic gradient into the GPS.

   COMPLIANCE DATE: Immediately.

3. Chevron shall continue to operate the GPS as a corrective action measure for remediation of groundwater contamination along the San Pablo Bay side of the refinery for at least one year after compliance has been achieved with the Maximum Allowable Concentration Limits (MACLs) established by this Order before any reduction or termination of groundwater extraction will be considered.

   COMPLIANCE DATE: Immediately, for at least one year after full compliance with the relevant MACLs.

4. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality impairment downgradient of the GPS is not improving, or continues to degrade, Chevron will be required to submit additional site-specific groundwater corrective action proposals.

   COMPLIANCE DATE: Six months after notification from the Executive Officer.

5. Components of the GPS Engineering Report pertaining to operation of the system may be amended as appropriate to incorporate changes in technology that will improve operational

efficiency. All proposed changes shall be submitted in writing to the Executive Officer for review and approval.

COMPLIANCE DATE: As needed.

Alkane Plant Plume Remediation

6. Chevron shall continue extracting free-phase hydrocarbons and to remediate dissolved benzene in groundwater, as needed, from the central portion of the Alkane Plant plume area such that contaminants do not migrate further from the source. The contaminant extraction shall be performed until the cleanup levels outlined in the *Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001) are achieved, and it is demonstrated that further recovery and remediation are no longer technically feasible or cost-effective and that termination of the program will not allow further subsurface migration of either free-phase or dissolved constituent plumes or any other adverse impacts to groundwater or surface water quality. The Alkane Plant plume recovery system currently consists of eight recovery wells.

   COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

S.P. Hill Tankfield Groundwater Cleanup Requirements

7. Chevron shall continue to operate the S.P. Hill Hydrocarbon Recovery System as provided by the *S.P. Hill Tankfield FPLH* (Free-Phase Liquid Petroleum Hydrocarbon) *Recovery Facilities Installation and Startup Report and Remediation Monitoring Plan* (Chevron Products Company, 1994), as modified in a letter to the Regional Water Board dated July 8, 2009. Chevron currently uses four recovery wells and absorbent pads instead of skimmers to remove free product. Chevron will continue to recover free-phase hydrocarbons at S.P. Hill to the extent practicable until it receives approval from the Executive Officer to cease operations.

   COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

8. Chevron shall continue to operate the S.P. Hill Groundwater Recovery Systems in basins 4 and 7 until it receives written approval from the Executive Officer to cease operations. To be eligible for this approval, Chevron must submit a written request certifying that the MACLs for the Bayside Sector - South have not been exceeded in any groundwater monitoring wells sampled per the attached Self-Monitoring Program for at least four consecutive reporting periods.

   COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

Salt Water Pump Station Monitoring Program

9. Chevron shall continue the monitoring and inspection program for the Salt Water Pump Station Area as outlined in the *No. 3 Salt Water Pump Station Monitoring Program* (Chevron Products Company, 1998).

COMPLIANCE DATE: Immediately.

Corrective Action Work Plan 250-foot Channel

10. Chevron shall continue to implement the plan, dated November 2002, for interim corrective action measures for petroleum hydrocarbon-contaminated sediment in the 250 Foot Channel site. The plan evaluated risks to potential human and ecological receptors at this site and included corrective action alternatives designed to minimize any identified risks. The plan shall continue to be implemented until modified by the Executive Officer.

    COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

Free-Phase Liquid Petroleum Hydrocarbon (FPLH) Recovery

11. Chevron shall continue to perform recovery activities, as needed, to remove FPLH from beneath the refinery if FPLHs are found in significant and recoverable quantities during routine monitoring of groundwater wells, in accordance with the *Free Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan* (Chevron USA, 2000). Chevron regularly recovers FPLHs using passive absorbent pads at wells containing measureable thicknesses of greater than 0.5 feet. The GPS, where present, is designed to function as a groundwater containment system that captures and prevents offsite migration of dissolved constituents; it is not intended to perform FPLH source control. FPLH recovery may be necessary to reduce the source for dissolved constituents that are introduced via the free-phase.

    COMPLIANCE DATE: Immediately.

Spill Reporting and Documentation of Cleanup

12. Chevron shall notify the Regional Water Board of any reportable quantity (42 gallons or more) of petroleum as defined in Health & Safety Code Chapter 6.67 *Above Ground Storage of Petroleum* that is either spilled or leaked to any unlined ground surface (any surface not protected by a barrier which is impermeable to petroleum products or other constituents which may cause adverse water quality impacts). Verbal notification shall be within one working day of knowledge of the spill and shall be followed by a written description to include the nature, location and volume of the spill, and the total area and/or soil volume affected. In addition, the written report shall include a map which identifies the location of the spill and photographic documentation of the spill area before and after cleanup.

    COMPLIANCE DATE: One day for verbal notification, five days for written notification.

Update Groundwater Self-Monitoring Program

13. Following implementation of each task described above, the Discharger shall review the Order No. R2-2011-0036 Self-Monitoring Program and propose any necessary updates to incorporate new groundwater monitoring wells, extraction systems, and/or sampling parameters. All

sampling protocols and reporting requirements shall be consistent with those described in Order No. R2-2011-0036 (see Attachment A).

COMPLIANCE DATE: As needed.

14. Revision of the Self-Monitoring Program: The Discharger shall submit a plan for the revision of the monitoring locations, parameters, frequency and MACLs contained within the Self-Monitoring Program attached to this Order (Part B). This plan is to be implemented immediately upon Executive Officer approval.

    COMPLIANCE DATE: June 15, 2012.

Pollard Pond Corrective Action

15. Pollard Pond Remedial Action Plan: The Discharger shall submit a plan, acceptable to the Executive Officer, proposing remedial plans to meet all MACLs at the point of compliance for the Pollard Pond.

    COMPLIANCE DATE: May 31, 2012

PROVISIONS

1. Compliance: The Discharger shall comply immediately, or as prescribed by the time schedule contained herein, with all Prohibitions, Tasks, and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. The Discharger must also comply with all conditions of these Site Cleanup Requirements. Violations may result in enforcement actions, including Regional Water Board orders or court orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of this Order by the Regional Water Board. [CWC § 13261, 13262, 13265, 13267, 13268, 13300, 13300, 13301, 13304, 13350].

2. Authority to Request Technical Reports: All technical and monitoring reports required by this Order are requested pursuant to CWC section 13267. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to CWC section 13268.

3. All technical reports submitted pursuant to this Order shall be prepared under the supervision of and signed by a California registered civil engineer, or a California professional geologist.

4. At any time, the Discharger may file a written request (including supporting documentation) with the Executive Officer, proposing modifications to the attached Self-Monitoring Program (SMP). If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the SMP.

5. Modifications to Remedial Action Plan: The Discharger shall notify the Executive Officer at least 60 days prior to implementing any proposed major modifications to any approved

Remedial Action Plan, Implementation Schedule, or remediation system. The notification shall include the rationale for any proposed modification.

6. Delayed Compliance: If the Discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the Tasks, the Discharger shall promptly notify the Executive Officer of the delay and reason for the delay and the Regional Water Board may consider revisions to this Order.

7. Operation and Maintenance (O&M): The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this order. [CWC section 13263(f)]

8. Availability: A copy of this Order shall be maintained by the Discharger and shall be made available by the Discharger to all employees or contractors performing work necessary to comply with the Tasks set forth in this Order. [CWC section 13263]

9. Change in Ownership: In the event of any change in control or ownership of the facility presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Regional Water Board upon a final change in ownership.

   To assume operation of this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of this Order within 30 days of the change of ownership. The request must contain the requesting entity's full legal name, mailing address, electronic address, and telephone number of the persons responsible for contact with the Regional Water Board. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. [CWC sections 13267 and 13263]

   Due Date: 30 days after a change in facility control or ownership

10. Stormwater**:** The Discharger shall comply with the provisions of the refinery's current NPDES permit for the management, monitoring and discharge of stormwater and wastewater effluent.

11. Reporting of Hazardous Substance Release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it probably will be discharged in or on any waters of the State, the Discharger shall:

    a. Report such discharge to the following:

       i. The Regional Water Board by calling (510) 622-2369 during regular office hours (Monday through Friday, 8 a.m. – 5 p.m.); and to

       ii. The California Emergency Management Agency at (800) 852-7550.

b. A written report shall be filed with the Regional Water Board within five working days. The report shall describe:

   i. The nature of the waste or pollutant.
   ii. The estimated quantity involved.
   iii. The duration of the incident.
   iv. The cause of the release.
   v. The estimated size of the affected area, and nature of the effect.
   vi. The corrective actions taken or planned and a schedule of those measures.
   vii. The persons/agencies notified.

This reporting is in addition to any reporting to the California Emergency Management Agency that is required pursuant to the Health and Safety Code.

12. Contractor/Consultant Qualifications: All technical documents shall be signed by and stamped with the seal of a California professional geologist, or a California registered civil engineer.

13. Lab Qualifications: All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g., temperature).

14. Document Distribution: Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following entities:

    a) The Regional Water Board, and
    b) The Department of Toxic Substances Control.

    The Executive Officer may modify this distribution list as needed.

15. Submittal Revisions: Where the Discharger becomes aware that it failed to submit any relevant facts in a report or submitted incorrect information in any report to the Regional Water Board, it shall promptly submit such facts or information. [CWC sections 13260 and 13267]

16. Severability: Provisions of these Site Cleanup Requirements are severable. If any provisions of these Requirements are found invalid, the remainder of these Requirements shall not be affected. [CWC 9213]

17. Geotracker Requirements: The State Water Board has adopted regulations requiring electronic report and data-submittal to Geotracker. The text of the regulations can be found at the following URL:

    http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

    Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit the following information electronically to Geotracker:

a. Groundwater analytical data;
b. Surveyed locations of monitoring wells;
c. Boring logs describing monitoring well construction; and
d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

18. Entry and Inspection: The Discharger shall allow the Regional Water Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the CWC, any substances or parameters at any location. [CWC section 13267]

19. Maintenance of Records: The Discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer. Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;
b. The individuals who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individuals who performed the analyses;
e. The analytical techniques or method used; and
f. The results of such analyses.

20. Report Certification: All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:

a. For a corporation – by a principal executive officer or the level of vice president.
b. For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.
c. For a municipality, state, federal, or other public agency – by either a principal executive officer or ranking elected official.

A duly authorized representative of a person designated in this provision may sign documents if all of the following are met:

- The authorization is made in writing by a person described in paragraph (a) of this provision;
- The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity; and
- The written authorization is submitted to the Executive Officer.

Any person signing a document under this Provision shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." [CWC § 13263, 13267, and 13268]

21. Cost Recovery: The Discharger (as applicable) shall be liable, pursuant to California Water Code section 13304 and Health and Safety Code section 25270.9 to the Regional Water Board for all reasonable costs actually incurred by the Regional Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. If the site addressed by this Order is enrolled in a State Water Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the Discharger (as applicable) over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

22. Periodic Site Cleanup Requirements (SCR) Order Review: The Regional Water Board will review this Order periodically and may revise it when necessary. The Discharger (as applicable) may request revisions and upon review the Executive Officer may recommend that the Board revise these requirements.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on February 8, 2012.

_____

Bruce H. Wolfe
Executive Officer

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FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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Figures:

Figure 1 - Location Map
Figure 2 - Regional Site Map with Geomorphic Boundaries
Figure 3 - Sector Boundaries
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Figure 5 - Plant 1 / Additives Plant Cap
Figure 6 - Pollard Sector
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Figure 8 - Landfarm/Landfill Sector
Figure 9 - Bayside Sector
Figure 10 - Effluent Sector
Figure 11 - Reclamation Sector
Figure 12 - North Yard Sector
Figure 13 - Groundwater Protection System

Attachment: Self-Monitoring and Reporting Program, Order No. R2-2012-0015

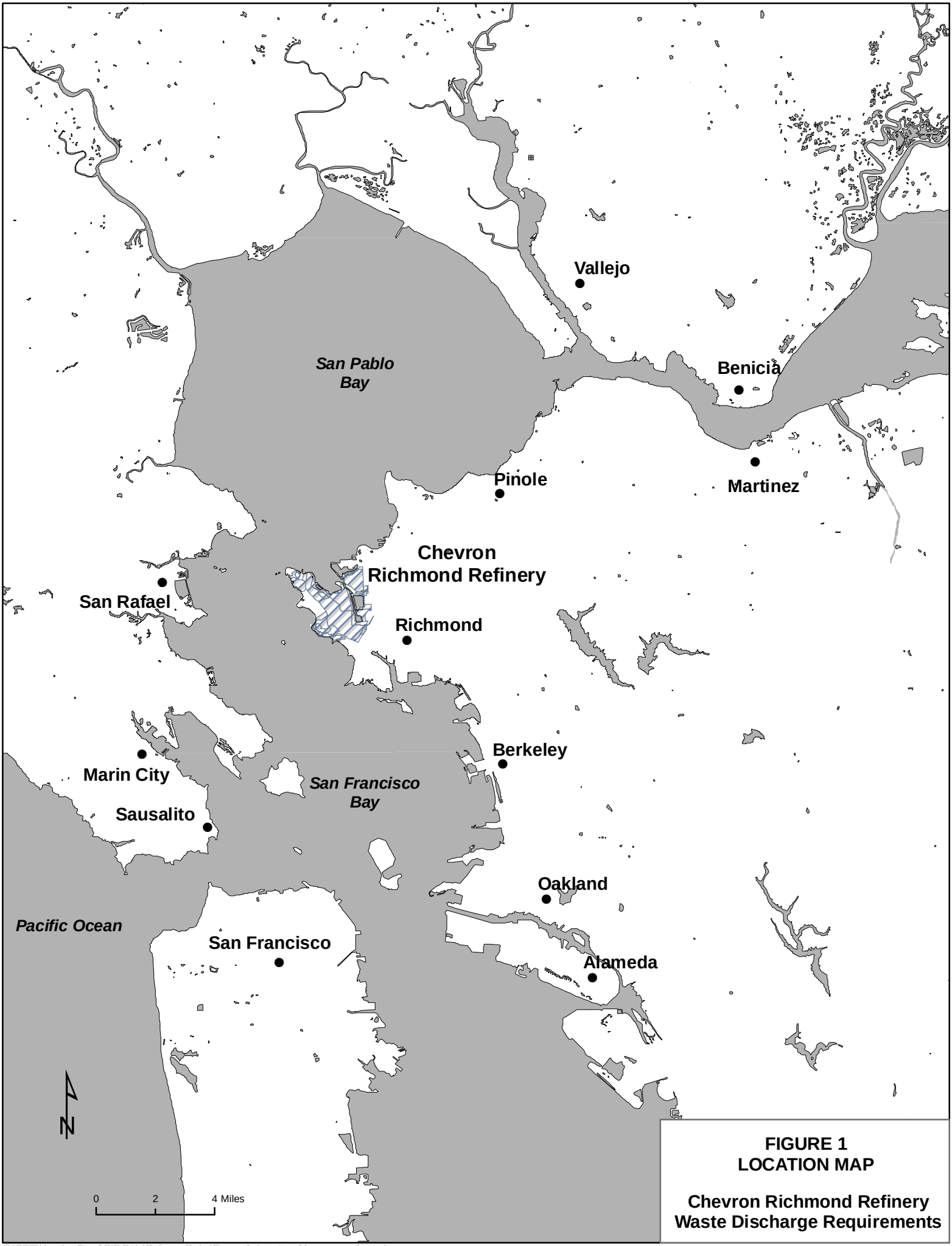


FIGURE 1
LOCATION MAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_1_Location_Map_grayscale.mxd

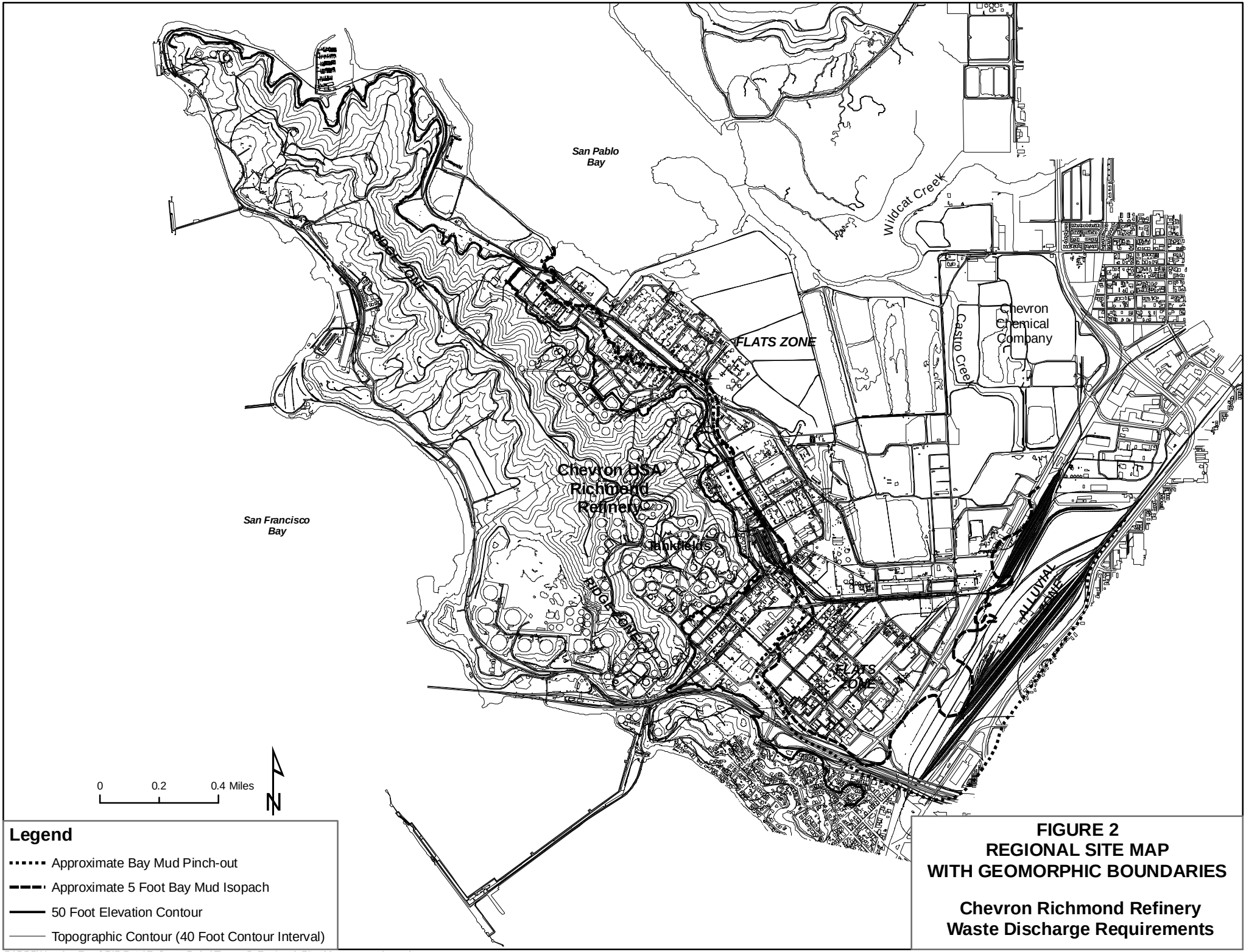


FIGURE 2
REGIONAL SITE MAP
WITH GEOMORPHIC BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_2_Regional_Site_Map_grayscale.mxd

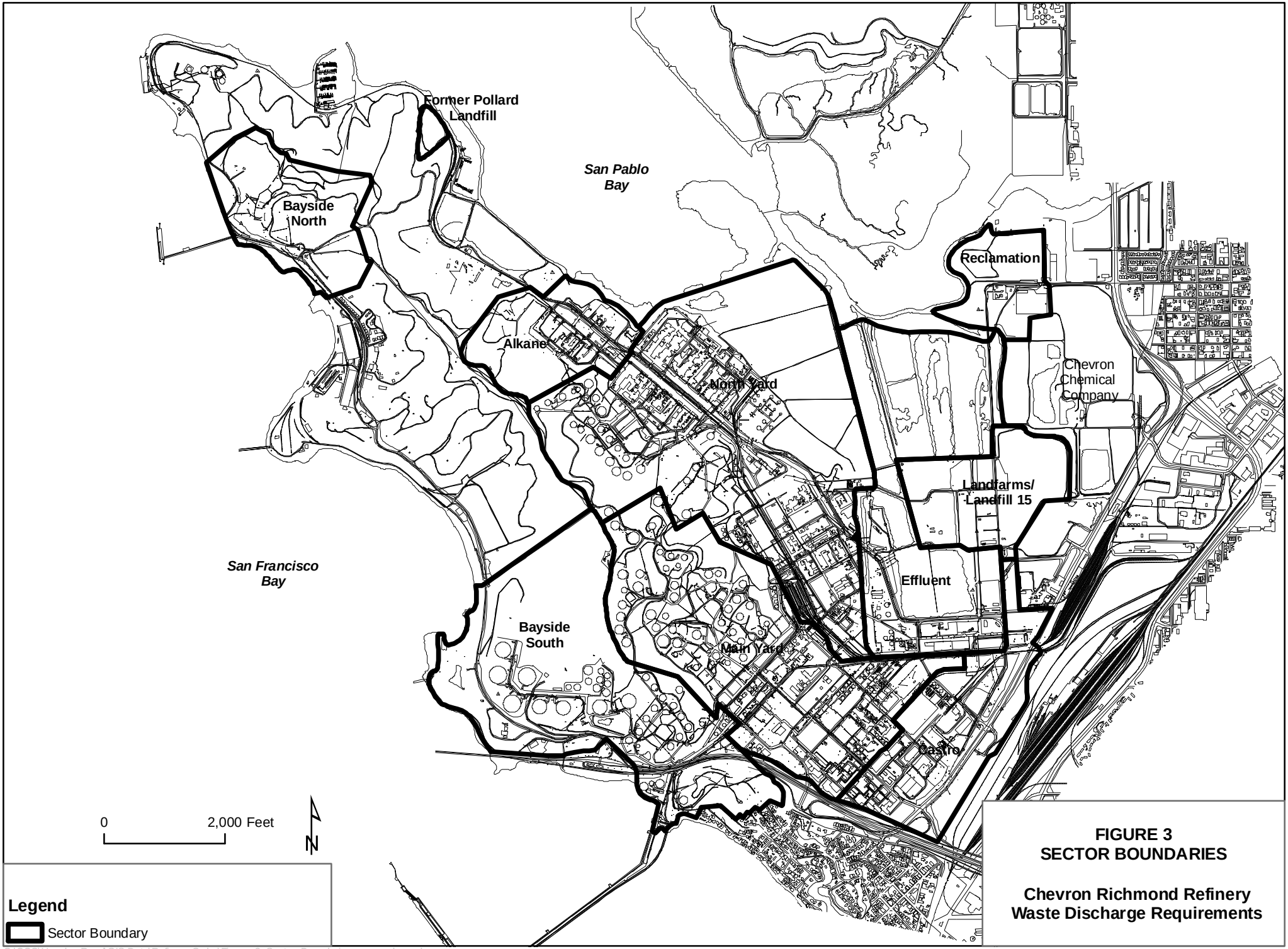


FIGURE 3
SECTOR BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_3_Sector_Boundaries_grayscale.mxd

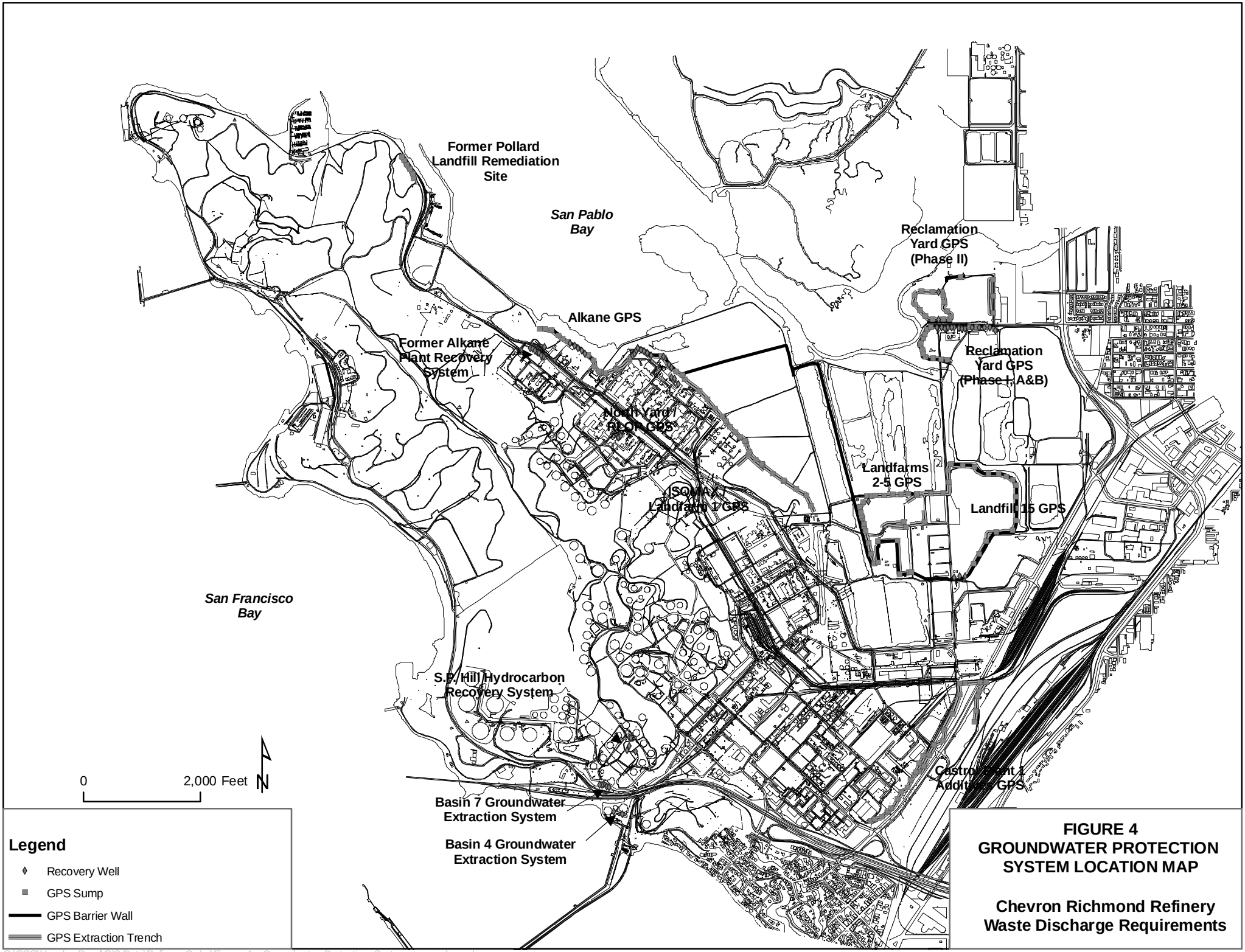
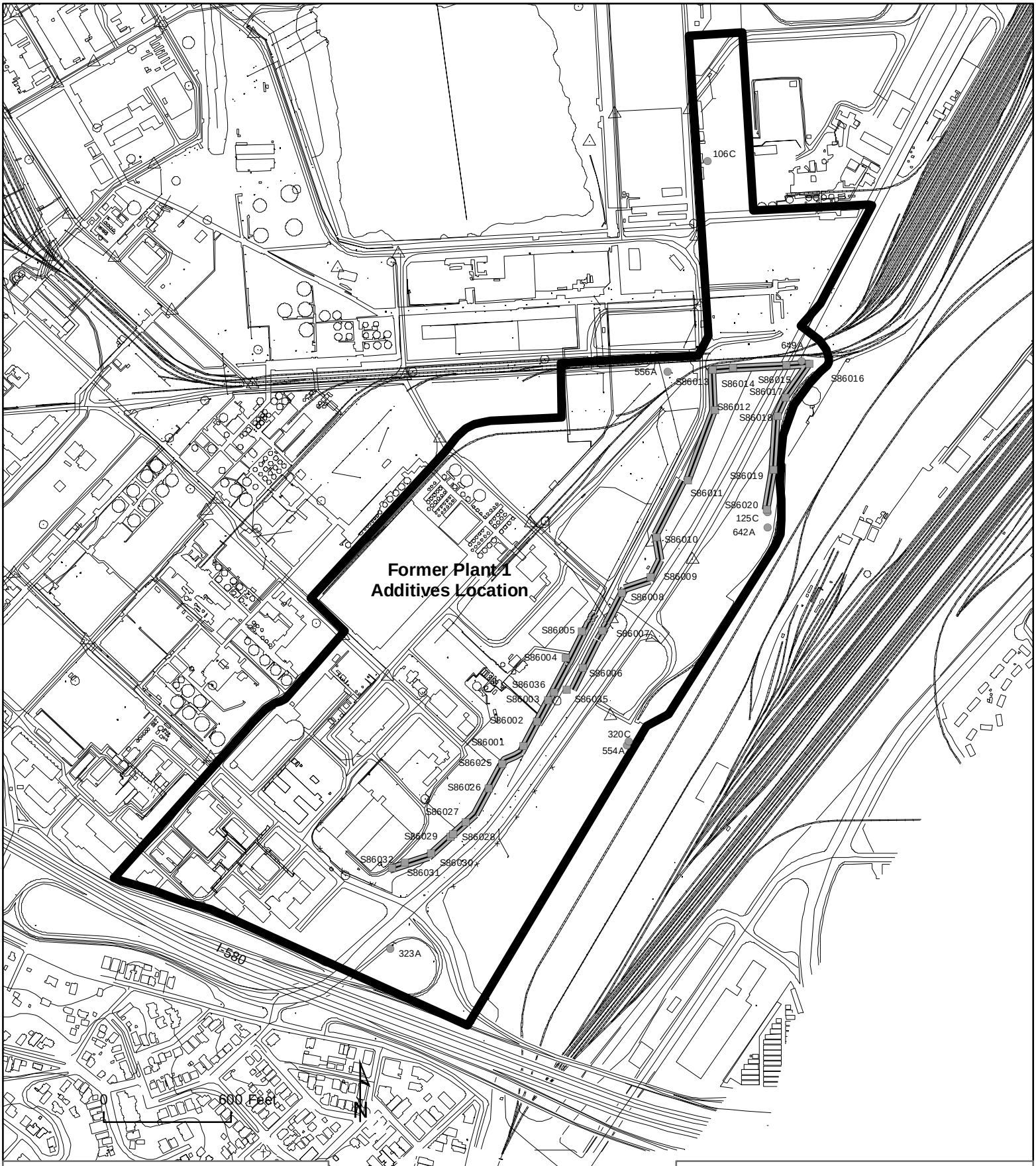


FIGURE 4
GROUNDWATER PROTECTION SYSTEM LOCATION MAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_4a_Groundwater_Protection_System_grayscale.mxd



Legend

- GPS Sump
- Monitoring Well
- GPS Extraction Trench
- Sector Boundary

FIGURE 5
PLANT 1 / ADDITIVES PLANT CAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_5_Plant_1_Additives_Plant_Cap_v2.mxd

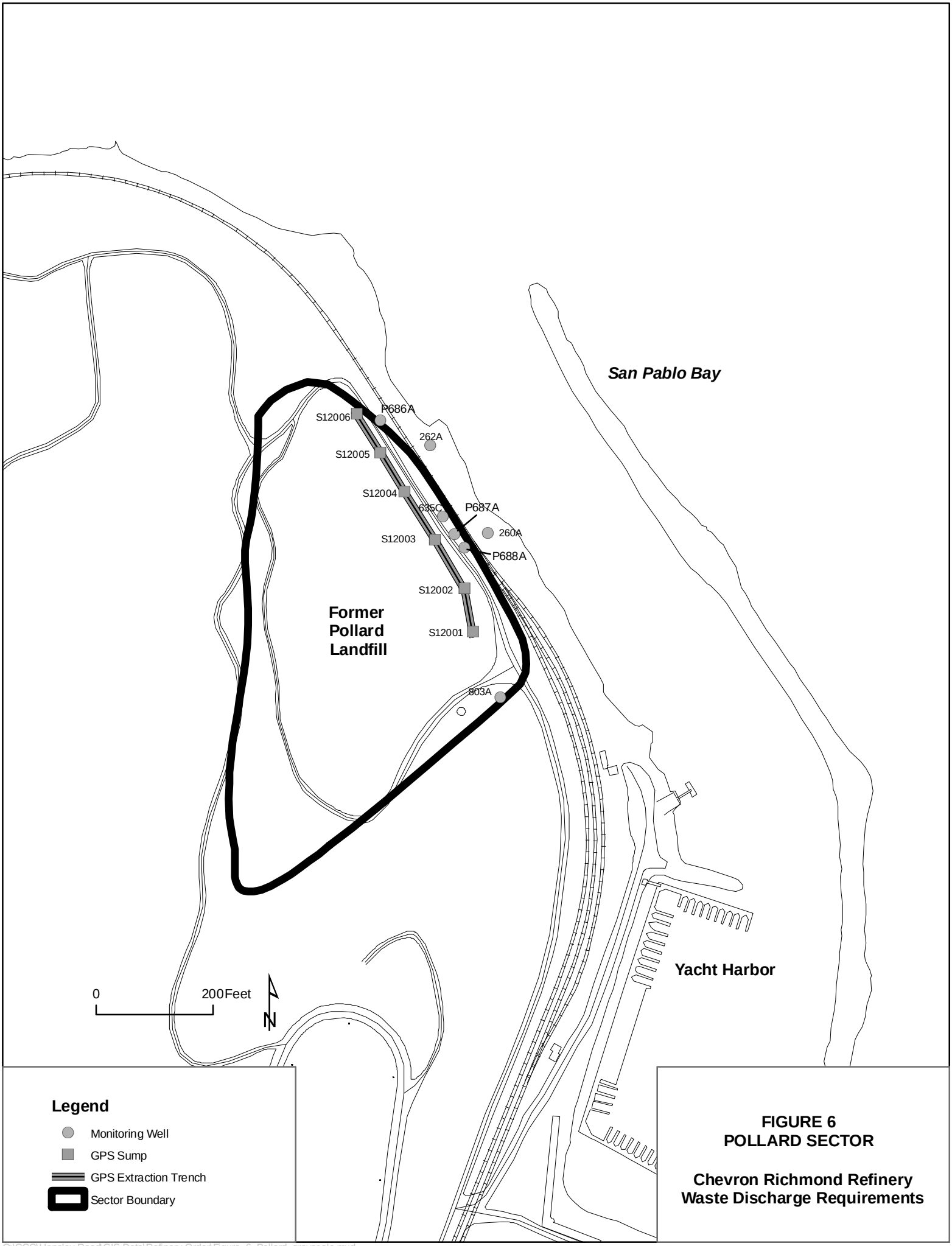


FIGURE 6
POLLARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_6_Pollard_grayscale.mxd

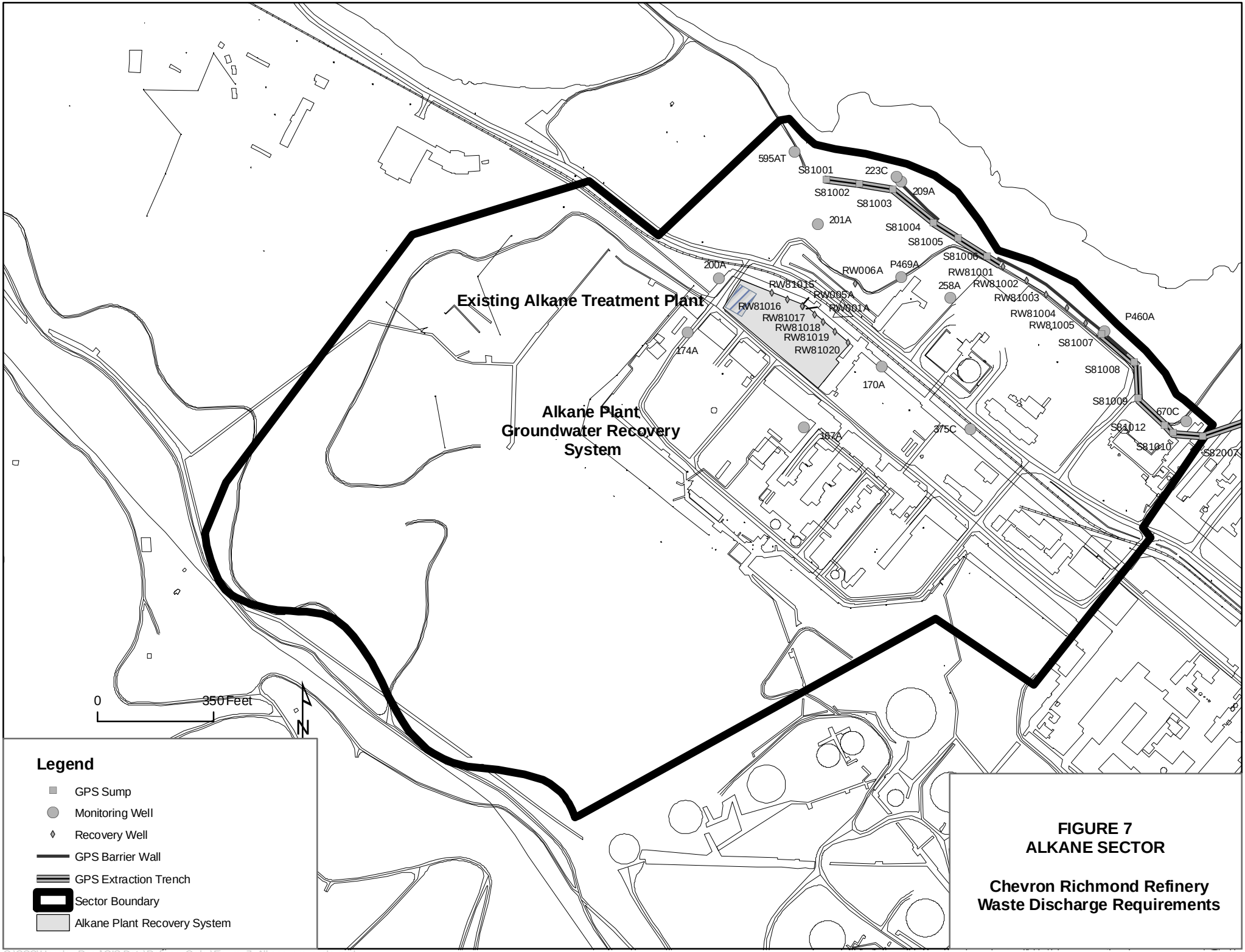


FIGURE 7
ALKANE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_7_Alkane_grayscale.mxd

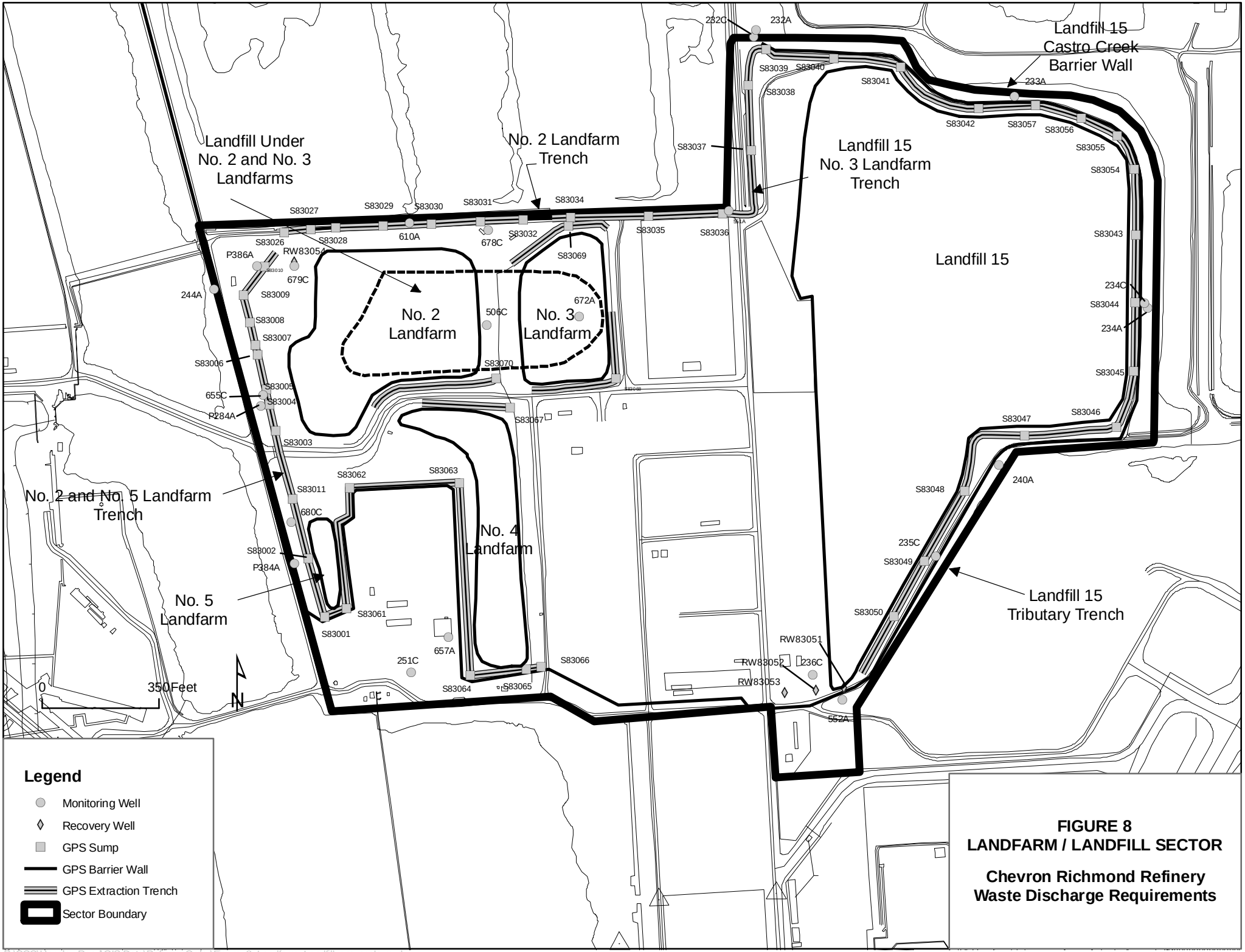
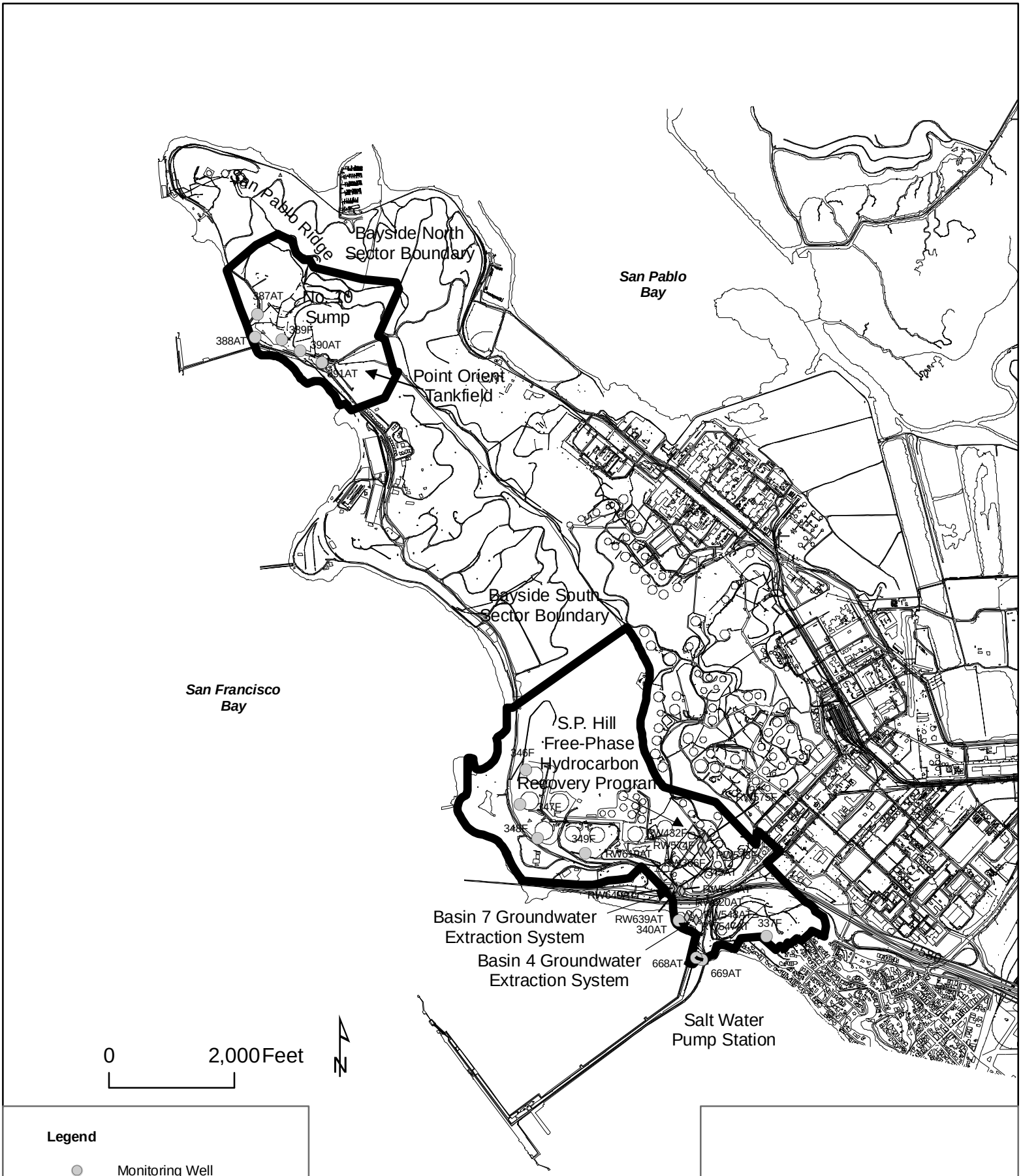


FIGURE 8
LANDFARM / LANDFILL SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_8_Landfarm_Landfill_grayscale.mxd



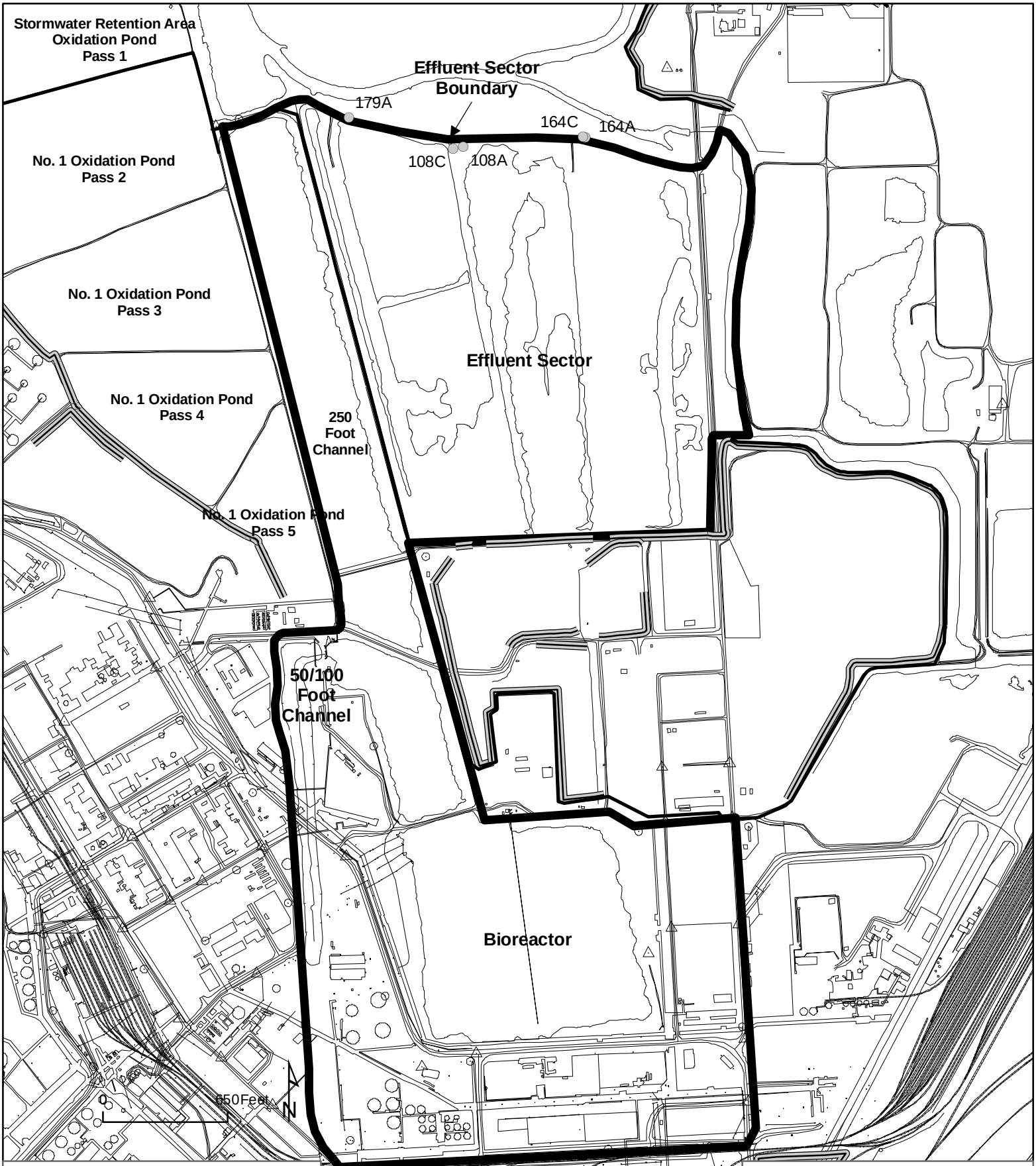
Legend

- Monitoring Well
- Bayside Recovery Well
- GPS Barrier Wall
- Sector Boundary

FIGURE 9
BAYSIDE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_9_Bayside_grayscale.mxd



Legend

- Monitoring Well
- GPS Barrier Wall
- GPS Extraction Trench
- Sector Boundary

FIGURE 10
EFFLUENT SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_10_Effluent_Sector_Large_grayscale.mxd

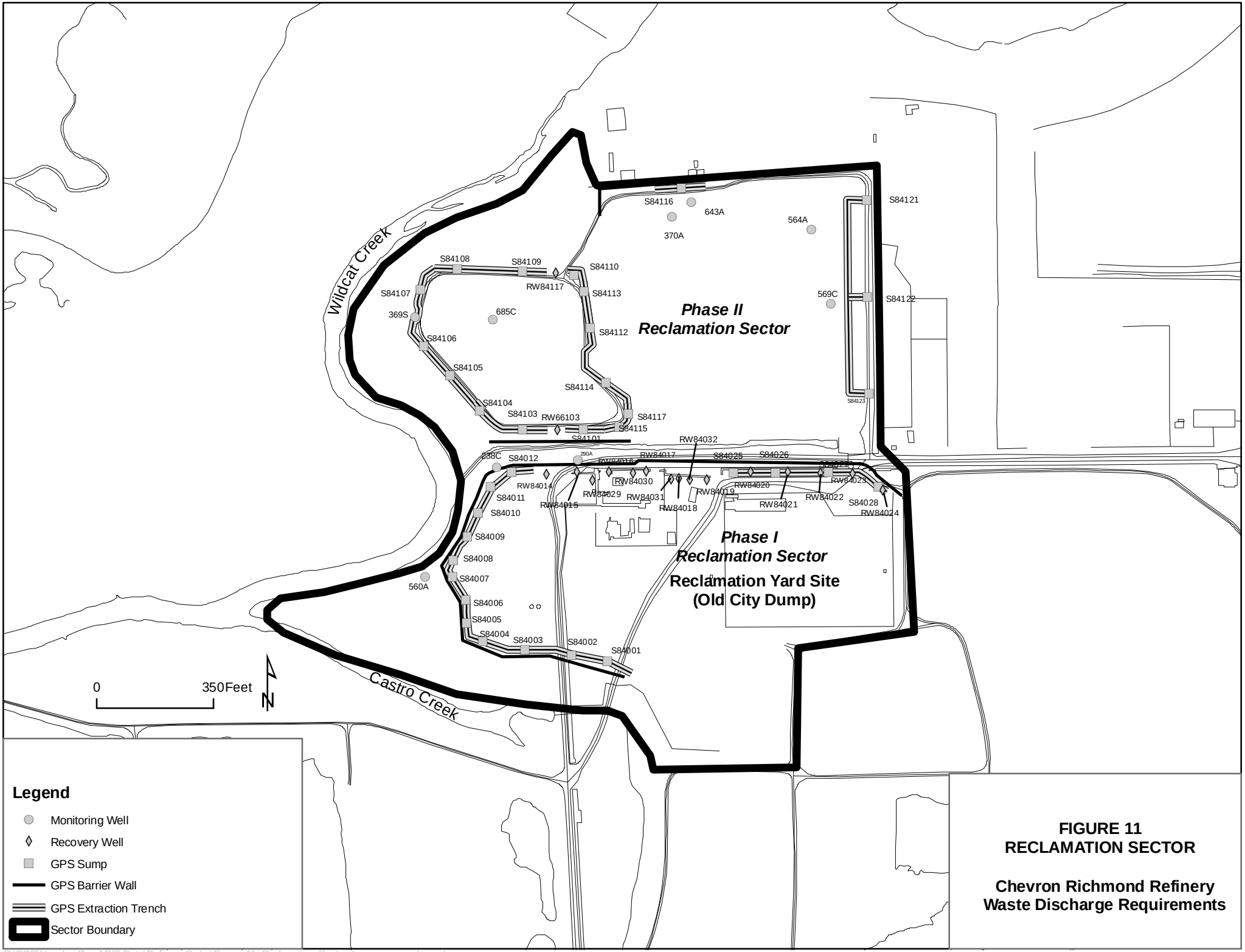


FIGURE 11
RECLAMATION SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_11_Reclamation Sector_Large_grayscale.mxd

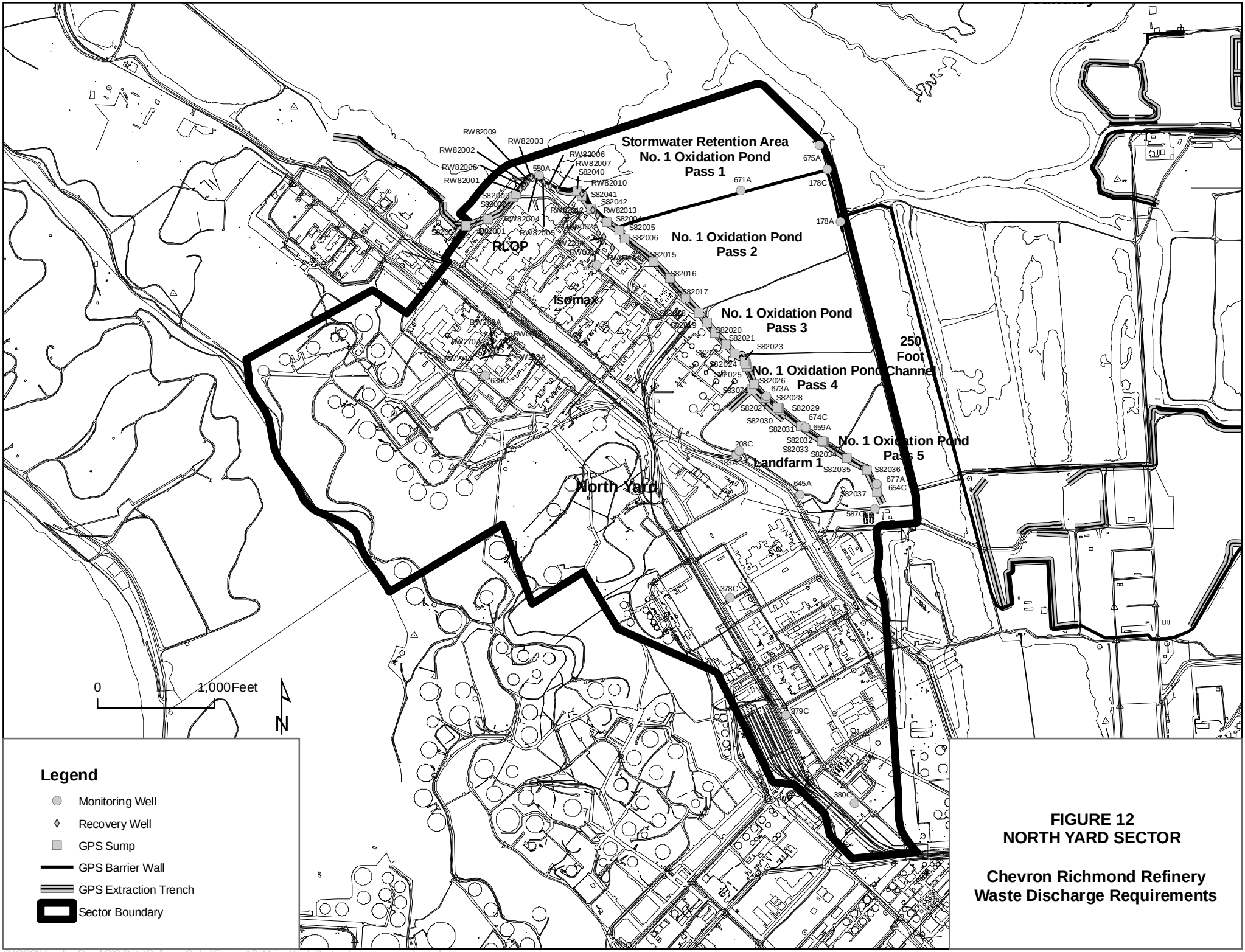


FIGURE 12
NORTH YARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

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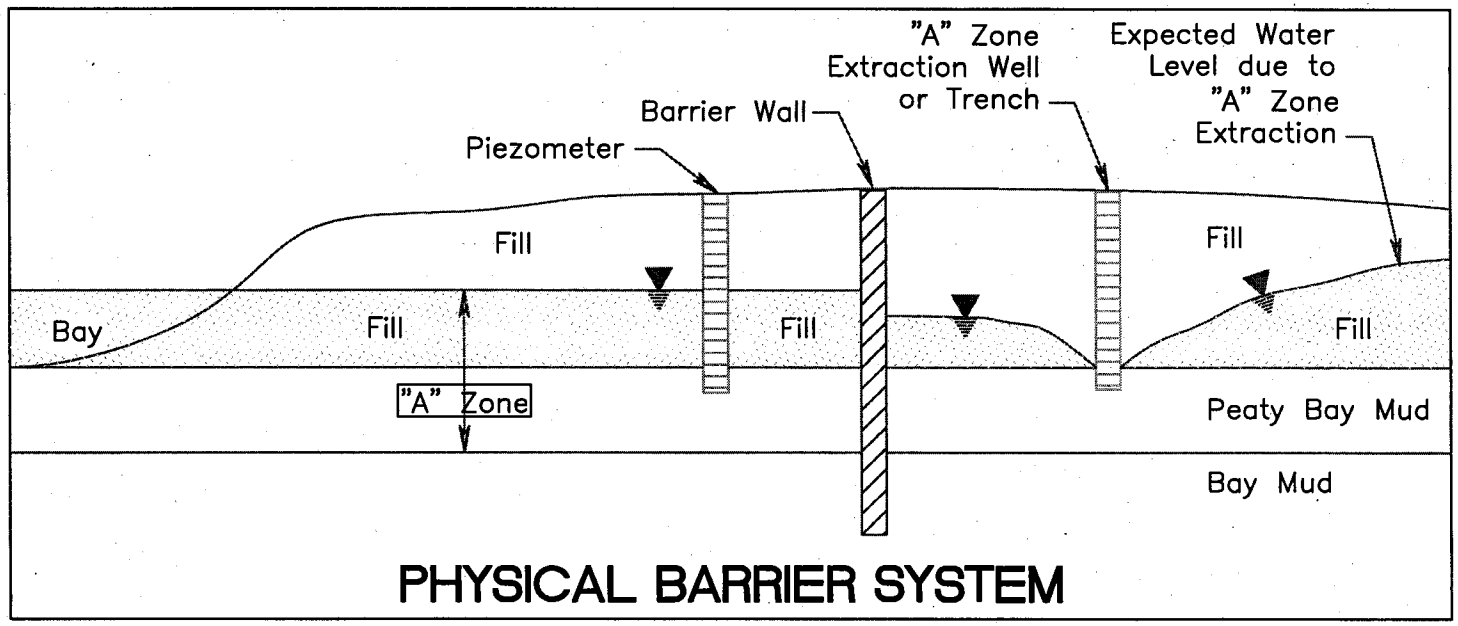

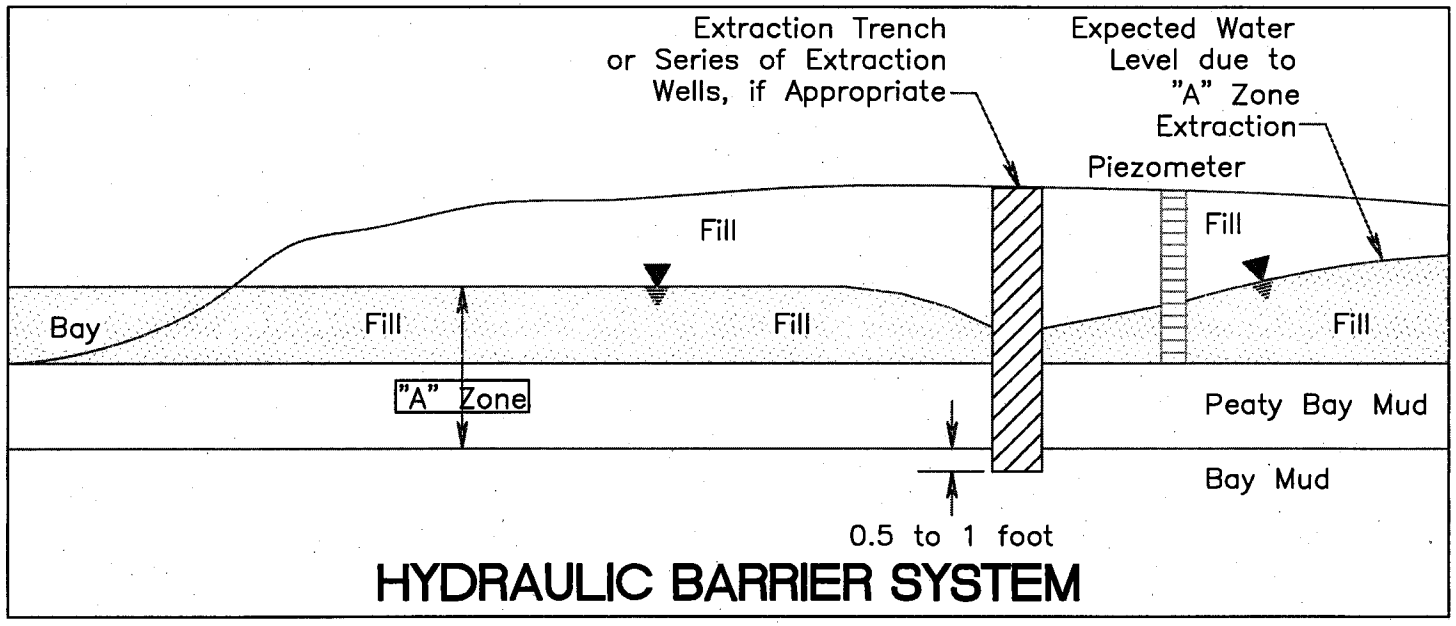

GROUNDWATER PROTECTION SYSTEM

Chevron Richmond Refinery
Waste Discharge Requirements

Figure 3

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING AND REPORTING PROGRAM

FOR

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

ORDER NO. R2-2012-0015

CONSISTS OF PART A AND PART B

PART A

This combined Self-Monitoring Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs) and Site Cleanup Requirements (SCRs), including:

(a) General monitoring requirements for landfills and waste management units under the WDRs (Part A);
(b) General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
(c) Self-monitoring report content and format (Part A);
(d) Self-monitoring report submittal frequency and schedule (Part B);
(e) Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
(f) Monitoring locations, parameters, analytes and frequency for programs under the SCRs (Part B).

A. AUTHORITY AND PURPOSE

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations (CCR), Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, sections 20380 through 20435. The principal purposes of an SMP include: 1) to document compliance with WDRs and prohibitions established by the Regional Water Board, 2) to facilitate self-policing by the discharger in the prevention and abatement of pollution arising from the waste discharge, 3) to develop or assist in the development of effluent standards of performance and toxicity standards, and 4) to assist the discharger in complying with the requirements of Title 27. Additionally, under California Water Code (CWC) section 13304, Chevron is required to implement corrective actions and monitor the effectiveness of the implemented corrective actions under this combined SMP.

B. MONITORING REQUIREMENTS

Monitoring refers to the observation, inspection, measurement, and/or sampling of environmental media, waste management units (WMUs), containment and control facilities, and waste disposed in each WMU. The monitoring programs designed to evaluate the potential release of wastes from WMUs are included in the WDRs Monitoring Program described in this combined SMP. Monitoring programs designed to evaluate the effectiveness of corrective actions implemented under CWC section 13304 are also described in the combined SMP. The following defines the types of monitoring that may be required.

Monitoring of Environmental Media

The Regional Water Board may require monitoring of groundwater, surface water, vadose zone, stormwater, leachate, and any other environmental media that may pose a threat to water quality or provide an indication of a water quality threat at the refinery.

Sample collection, storage, and analyses shall be performed according to the most recent version

of U.S. EPA-approved methods or in accordance with Groundwater Monitoring Program Standard Operating Procedures (SOP) or subsequent revisions approved by Regional Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a California State-approved laboratory for the required analyses. The director of the laboratory whose name appears on the certification shall be responsible for supervising all analytical work in his/her laboratory and shall have signing authority for all laboratory data reports or may designate signing of all such data included in reports submitted to the Regional Water Board.

All monitoring instruments and devices used to conduct monitoring in accordance with this SMP shall be maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once every two years.

Receiving waters refer to any surface water which actually or potentially receives surface or groundwater that pass over, through, or under waste materials or impacted soils. In this case, the groundwater beneath and adjacent to the WMU areas and the surface runoff from the refinery site are considered receiving waters.

Standard Observations

Standard observations refer to observations within the limits of each WMU, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

1. Waste Management Units:
   a. Evidence of ponded water at any point on the WMU;
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

2. Perimeter of Waste Management Units:
   a. Evidence of liquid leaving or entering the WMU, estimated size of affected area and flow rate (show affected area on map);
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

3. Receiving Waters:
   a. Floating and suspended materials of waste origin, including their presence or absence, source, and size of affected area;
   b. Discoloration and turbidity: description of color, source, and size of affected area;
   c. Evidence of odors, presence or absence, characterization, source, and distance of travel form source;
   d. Evidence of beneficial use, such as presence of water associated with wildlife;
   e. Estimated flow rate; and
   f. Weather conditions, such as estimated wind direction and velocity, total precipitation.

Facilities Inspections

Facilities inspections refer to the inspection of all containment and control structures and devices associated with the environmental monitoring of the refinery. Containment and control facilities may include the following:

1. Intermediate and final covers; and
2. Stormwater management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks.

Quality Assurance/Quality Control (QA/QC) Sample Monitoring

Chevron shall collect duplicate, field blank, equipment blank (if appropriate) and trip blank samples for each monitoring event at the frequency specified in the latest version of the Groundwater Monitoring Program SOP.

C. REPORTING REQUIREMENTS

Reporting responsibilities of waste dischargers under WDRs and SCRs are specified in CWC § 13225(a), 13267(b), 13383, and 13387(b) and this Regional Water Board's Resolution No.73-16 and Title 27. At a minimum, each Self-Monitoring Report (SMR) shall include the following information:

1. Transmittal Letter: A cover letter transmitting the essential points of the monitoring report shall be included with each monitoring report. The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

2. Graphic Presentation: The following maps, figures, and graphs (if applicable) shall be included in each SMR to visually present data collected pursuant to this SMP:

   a. Plan-view maps showing all monitoring and sampling locations, WMUs, containment and control structures, treatment facilities, surface water bodies, and site/property boundaries;
   b. Groundwater level/piezometric surface contour maps for each groundwater-bearing zone of interest showing inferred groundwater gradients and flow directions under/around each WMU, based upon the past and present water level elevations and pertinent visual observations; and
   c. Any other maps, figures, photographs, cross-sections, graphs, and charts necessary to visually demonstrate the appropriateness and effectiveness of sampling, monitoring, characterization, investigation, or remediation activities relative to the goals of this SMP.

3. Tabular Presentation: The following data (if applicable) shall be presented in tabular form and included in each SMR to show a chronological history and allow quick and easy reference:

a. Well designation;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths;
e. Groundwater elevations;
f. Current analytical results (including analytical method and detection limits for each constituent);
g. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
h. Measurement dates.

4. Compliance Evaluation Summary and Discussion:

a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections;
b. The quantity and types of wastes captured by the GPS and hydrocarbon recovery program, and the location these wastes were disposed of during the reporting period, if applicable;
c. A description of the waste stream, if applicable;
d. The signature of the laboratory director or his/her designee in laboratory data deliverables indicating that he/she has supervised all analytical work in his/her laboratory; and
e. A discussion of the field and laboratory results that includes the following information:

(1) Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
(2) Conclusions;
(3) Recommendations;
(4) Newly implemented or planned investigations and remedial measures;
(5) Data anomalies;
(6) Variations from protocols;
(7) Condition of wells; and
(8) Effectiveness of leachate monitoring and control facilities.

5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Regional Water Board staff and unless the information is already contained in an SAP or SOP approved by Regional Water Board staff:

a. New boring and well logs;
b. Method and time of water level measurements;
c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and electrical conductivity, calibration of the field equipment, pH temperature, conductivity, and turbidity measurements, and method of disposing of the purge water;
d. Sampling procedures, field, equipment, and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name of the person actually taking the samples, and any other relevant observations; and

e. Documentation of laboratory results, analytical methods, detection limits and reporting limits, and Quality Assurance/Quality Control (QA/QC) procedures for the required sampling.

D. ANNUAL REPORTING

The Discharger shall submit an annual self-monitoring report to the Regional Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information for each monitoring event during the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

1. **Graphic Presentation**
   Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

   a. Known or probable contaminant sources;
   b. Well locations;
   c. Groundwater elevation contours;
   d. Inferred groundwater flow direction(s);
   e. Identify wells containing phase-separated product;
   f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
   g. Appropriate analytical results.

   Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:

      i. Vertical and lateral extent of contamination;
      ii. Contaminant sources;
      iii. Geologic structures;
      iv. Soil lithology;
      v. Water table/piezometric surfaces;
      vi. Sample locations;
      vii. Sample analytical results; and
      viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

2. **Tabular Presentation**
   Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

   a. Well designations;
   b. Well location coordinates (latitude and longitude);

c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths;
e. Groundwater elevations;
f. Horizontal groundwater gradients;
g. Vertical groundwater gradients (including comparison wells from different zones);
h. Phase-separated product elevations;
i. Phase-separated product thickness;
j. Current analytical results (including analytical method and detection limits for each constituent);
k. Historical analytical results for the most recent four sampling events;
l. Measurement dates;
m. Groundwater extraction, including:

    i. Average daily extraction rate;
    ii. Total volume extracted for monitoring period;
    iii. Annual cumulative total volume extracted; and

n. Estimate of contaminant volume extracted (reported in gallons) including:

    i. Average daily removal rate;
    ii. Total volume removed for monitoring period;
    iii. Annual cumulative total volume removed.

3. **Discussion**
Provide a discussion of the field and laboratory results that includes the following information:

a. Data Interpretations;
b. Conclusions;
c. Recommendations;
d. Newly implemented or planned investigations and remedial measures;
e. Data anomalies;
f. Variations from protocols; and
g. Conditions of wells.

E. CONTINGENGY REPORTING

1. The Discharger shall report any seepage from the surface of any WMU or discharge prohibited in the WDRs or SCRs immediately after it is discovered to the Regional Water Board by calling the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov. The Discharger shall submit a written report with the Regional Water Board within five days of discovery of any discharge. The written report shall contain, at a minimum, the following information:

a. A map showing the location(s) of discharge;
b. Approximate flow rate;
c. A description of the nature of the discharge; and
d. Corrective measures underway or proposed.

2. The Discharger shall submit a written report to the Regional Water Board within seven working days of determining that a statistically significant difference occurred in the sample result compared against the historical dataset and above an approved WQPS in a perimeter segment-monitoring well. In addition, evaluation of GPS performance will be reviewed to examine the effectiveness of hydraulic control.

   a. Chevron shall immediately re-sample at the compliance point where the exceedence was observed, evaluate the result against the historical dataset and re-analyze if results are not consistent with historical trends.

   b. If re-sampling and analysis confirm the exceedence through statistical analysis, Chevron shall document this in the text of the next Annual Report and notify the Regional Water Board in writing within 21 days of re-sampling. In this letter, Chevron shall evaluate whether any re-sampling or additional corrective measures need to be implemented.

F. ELECTRONIC REPORTING

1. **Geotracker Requirements**
   The State Water Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:

   http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

   Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit the following information electronically to Geotracker:

   a. Groundwater analytical data;
   b. Surveyed locations of monitoring wells;
   c. Boring logs describing monitoring well construction; and
   d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

   Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

2. **Data Tables**
   Upon request, monitoring results shall also be provided electronically in Microsoft Excel@ or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report. Electronic tables shall include the following information:

a. Well designations;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths and elevations (water levels);
e. Phase-separated product thicknesses and elevations;
f. Current analytical results by constituent of concern (including detection limits for each constituent);
g. Historical analytical results (including the past four sampling events); and
h. Measurement dates.

G. MAINTENANCE OF WRITTEN RECORDS

The Discharger shall maintain information required pursuant to this SMP for a minimum of five years. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board.

PART B: MONITORING AND OBSERVATION SCHEDULE

1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS

A. GROUNDWATER MONITORING:

Semi-Annual Reports: **Due August 31 and March 1 of each year**
Annual Report: **Due March 1 of each year**

Groundwater shall be sampled and analyzed as detailed in Tables 2 and 4. Monitoring well locations are listed in Tables 1 and 3. Groundwater analyses shall include the following field measurements: pH, temperature, specific conductance, water level, volume purged, number of casings volumes purged, and whether the well went dry during sampling (including measures taken to ensure accuracy of analyses given this condition). Groundwater monitoring wells installed in the future will be sampled and analyzed as detailed in Tables 2 and 4 and on a quarterly basis until a statistically significant dataset is established.

B. FACILITIES MONITORING - **Observe quarterly, report semi-annually**

Semi-Annual Report: **Due August 31 and March 1 of each year**
Annual Report: **Due March 1 of each year**

The Discharger shall inspect all facilities to ensure proper and safe operation and report semi-annually. The facilities to be monitored shall include, but not be limited to:

1. Waste Containment systems;
2. Waste treatment systems;
3. Surface water retention basins;
4. Leak detection systems (where applicable); and
5. Leachate/groundwater management facilities and secondary containment where applicable.

2. GPS PERFORMANCE MONITORING

Chevron shall measure the water level in each GPS corrective action monitoring well and in a sufficient number of wells or piezometers both upgadient and downgradient of the GPS to demonstrate continuous maintenance of a hydraulic depression in the GPS trenches (inward hydraulic gradient). To demonstrate the effectiveness of the GPS, Chevron shall include the following for each refinery sector in the semi-annual SMRs:

a. contour maps of 1st and 3rd quarter GPS groundwater elevation data;

b. hydrographs showing water level data (measured at least once per week) at each operating extraction sump or recovery well;
c. a narrative summary of the GPS performance during the reporting period; and,
d. an estimate of the volume of groundwater extracted during the reporting period.

3. ON-SITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING

Closed WMUs (Plant l/Additives Plant, Landfill 15, Landfarms 1-5, the Hydropits, Parr-Richmond Landfill and the Gertrude Street Site) shall be inspected annually by a registered California engineer or geologist prior to the onset of the rainy season. These annual inspections shall include identification of areas of the final covers where the soil has become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Chevron shall perform appropriate repairs for these areas prior to the rainy season. In addition, Chevron shall monitor runoff/run-on control facilities for their effectiveness and overall condition as needed according to weather conditions during the winter months (November through April) and as prescribed in the approved post-closure maintenance/monitoring plan for each individual WMU. Chevron shall maintain records of all inspections and repairs and summarize in each semi-annual monitoring report any repairs made during the corresponding reporting period.

4. ALKANE PLANT PLUME REMEDIATION MONITORING

Chevron shall continue to monitor the Alkane Plant Plume remediation effort in accordance with *the Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001). The monitoring components of this plan include measuring potentiometric water levels, liquid hydrocarbon thickness, and benzene and fluoride concentrations. Benzene and fluoride concentrations will continue to be measured annually in samples collected from 6 wells (listed in Table 1), located around the perimeter of the plume to verify containment of the plume.

5. FREE-PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY

Chevron shall include a map in each semi-annual SMR that shows the locations of all wells within the refinery that contain FPLH. The measured thickness of the FPLH in each well should be indicated on the map next to the well. Recovery of FLPH will be performed in accordance with the procedures described in the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery* (URS, 2000). In addition, the SMR shall include a description of FPLH recovery method used, recovery volume data for the reporting period and cumulative recovery data for each active recovery well or system.

6. CHEMICAL CONSTITUENT MONITORING

a. Refinery-Wide Groundwater Monitoring Program: Chevron shall sample the Refinery-Wide Corrective Action Groundwater Monitoring Program compliance monitoring points listed in Table 1 for the analytical parameters and at the frequencies listed in Table 2. All monitoring activities, including analytical and QA/QC procedures will be conducted in

accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

b. Landfarm Post-Closure Monitoring Program: Chevron shall sample the Landfarms Post-Closure Monitoring Program monitoring points listed in Table 3 for the analytical parameters and at the frequencies listed in Table 4. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure. Monitoring events for constituents of concern and Appendix IX analyses shall alternate between periods of highest and lowest groundwater levels.

c. Chevron shall sample new wells installed to monitor Landfarms 1 through 5 for COCs and MPs listed in Table 4 over eight consecutive quarters. Within the first year after installation, Chevron shall analyze new wells for the Appendix IX constituents listed in Table 4. Chevron shall add any new compounds detected in new wells to the list of COCs in Table 4.

d. Chevron shall sample the monitoring points listed in Table 3 regardless of the presence of nonaqueous phase liquid as follows:

   i. For monitoring points with persistent nonaqueous phase liquid (e.g., more than two consecutive quarters), Chevron shall collect samples every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent nonaqueous phase liquid (e.g., not detected during consecutive quarters), Chevron shall collect samples semi-annually.

   ii. Chevron shall obtain samples for dissolved phase analysis after purging nonaqueous phase liquid from the well, by low-flow sampling, or by another appropriate method.

   iii. Chevron shall follow the most recent version of the Chevron Groundwater Monitoring Program Standard Operating Procedure.

e. Chevron shall monitor “A” Zone monitoring points in Table 3 under a corrective action monitoring program (22 CCR 66264.100).

f. Chevron shall monitor “C” Zone monitoring points in Table 3 under a detection monitoring program (22 CCR 66264.98).

Attachments:

Table 1: List of Monitoring Wells by Sector, Refinery-Wide Groundwater Monitoring Program
Table 2: Maximum Allowable Concentration Limits for Constituents of Concern and Monitoring Parameters for the Refinery-Wide Groundwater Monitoring Program
Table 3: Landfarm Area Monitoring Well Network
Table 4: Landfarm Post-Closure Monitoring Program, Monitoring Parameters, Constituents of Concern and MACLs

Table 1: List of Monitoring Wells by Sector
Refinery-Wide Groundwater Monitoring Program
Chevron Richmond Refinery

Alkane Sector	Castro and Plant 1/Add. Sector	Landfarms /Landfill 15 Sector	North Yard Sector	Reclamation Yard Sector	Pollard Sector	Effluent Sector	Bayside North	Bayside South	Interior "C" Zone
209A	323A	232A	178A	290A	260A	108A	387AT	346F	208C
P460A	642A	233A	675A	643A	262A	164A	388AT	347F	638C
595AT	554A	234A	550A	370A	803A	179A	389F	348F	378C
223C	556A	240A	377C	560A	635C	108C	390AT	349F	379C
375C	106C	244A	178C	685C		164C	391AT	351CT	380C
670C	125C		671A	238C				345AT	138C
167A*	320C	551A		369S				340AT	382C
170A*	649A	552A		564A				337F	
174A*		232C		569C				RW619AT#	
200A*		234C						RW534AT#	
201A*		235C							
258A*		236C							

Notes:
* Wells associated with Alkane Plant Plume Remediation Monitoring
# Wells with Remediation Monitoring Plan, S.P. Hill Tankfield

Table 2: Maximum Allowable Concentration Levels (MACLS) for Constituents of Concern and Monitoring Parameters for the Chevron Refinery -Wide Groundwater Monitoring Program

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
TPH-Gas	1200	*	S	S	S	S	S	S	S	S	S	S
TPH- Diesel	640	*	S	S	S	S	S	S	S	S		S
Benzene	46	*	S	S	S	S	S	S	S	S	B	S
MTBE	1800	*	S	S	S	S	S	S	S	S	B	S
Acenaphthene	40	*	B	B	B	B	B	B	B	B	B	
Acenaphthylene	307	*	B	B	B	B	B	B	B	B	B	
Anthracene	21	*	B	B	B	B	B	B	B	B	B	
Benzo(a)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(b)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(g,h,i)perylene		*	B	B	B	B	B	B	B	B	B	
Benzo(k)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Chrysene	0.049	*	B	B	B	B	B	B	B	B	B	
Dibenzo(a,h)anthracene	0.049	*	B	B	B	B	B	B	B	B	B	
Fluoranthene	7.1	*	B	B	B	B	B	B	B	B	B	
Fluorene	39	*	B	B	B	B	B	B	B	B	B	
Indeno(1,2,3-cd)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Naphthalene	194	*	B	B	B	B	B	B	B	B	B	
Phenanthrene	19	*	B	B	B	B	B	B	B	B	B	
Pyrene	10	*	B	B	B	B	B	B	B	B	B	
Chlordane	0.00059	*		B						B		
G-BHC (Lindane)	0.063	*		B						B		
Dieldrin	0.0019	*		B						B		
Selenium	5.0	*	B	B	B			S	B	B	B	
Arsenic	36	*	S	B					B	S		
Cadmium	9.3	*	B	B	B			B	B	B	S	B
Chromium VI	50	*	B	B	B			B	B	B	B	B
Lead	5.6	*	S	S	S	S	S	S	S	S		B
Mercury	0.025	*	B						B	B		
Nickel	8.2	*	S	B	S			S	B	S	S	S

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
Zinc	71	*	S	B	B			B	B	B	S	B
Fluoride	2400	*						S				
Un-ionized Ammonia-N	25	*							B	B		
pH	6.5 to 8.5	*	S	S	S	S	S	S	S	S	S	S
Turbidity (NTUs)	N/A	N/A	S	S	S	S	S	S	S	S	S	S
Temperature	N/A	N/A	S	S	S	S	S	S	S	S	S	S

Notes:
* MACLs to be reviewed and updated by the Discharger per Task 14

S = Monitoring Parameter per Sector (analyzed semi-annually)
B= Constituent of concern per Section (analyzed during summer/fall reporting period every 2 years (even-numbered years)

N/A = not applicable
(NTUs) = Nephelometric Turbidity Units

Table 3
Landfarm Area Monitoring Well Network

Monitoring Wells for Landfarm Area
"A" Zone Wells
183A (POC)
610A (POC)
645A
657A
659A (POC)
672A
673A
677A
P284A (POC)
P384A
P386A
"C" Zone Wells
251C (POC)
506C (POC)
587C
654C (POC)
655C (POC)
674C
678C (POC)
679C (POC)
680C (POC)

Notes:
POC indicates that well is a point of compliance well.

Table 4
Landfarms Post-Closure Monitoring Program
Monitoring Parameters, Constituents of Concern and MACLs

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Monitoring Parameters				
pH	6.5 to 8.5	1	S	S
Specific Conductivity	N/A	N/A	S	S
Turbidity	N/A	N/A	S	S
Temperature	N/A	N/A	S	S
Arsenic	36	*	S	S
Lead	5.6	*	S	S
Nickel	8.2	*	S	S
Zinc	71	*	S	S
TPH-Gasoline	1200	*	S	S
TPH-Diesel	640	*	S	S
TPH-Diesel Silica Gel	640	*	S	S
Benzene	46	*	S	S
MTBE	1800	*	S	S
Toluene	5000	*	S	S
Phenolics (Total)	50	*	S	S
Constituents of Concern				
Cadmium, Dissolved	9.3	*	B	B
Chromium VI, Dissolved	50	*	B	B
Mercury, Dissolved	0.025	*	B	B
Selenium, Dissolved	5	*	B	B
Dissolved sulfide	100	*	B	B
Methylene Chloride	1600	*	B	B
Acenaphthene	40	*	B	S
Acenaphthylene	307	*	B	S
Anthracene	21	*	B	S
Benzo(a)anthracene	2.2	*	B	S
Benzo(a)pyrene	0.96	*	B	S
Benzo(b)fluoranthene	0.049	*	B	S
Benzo(g,h,i)perylene	X	*	B	S
Benzo(k)fluoranthene	0.049	*	B	S
Chysene	0.049	*	B	S
Dibenzo(a,h)anthracene	0.049	*	B	S
Fluoranthene	7.1	*	B	S
Fluorene	39	*	B	S
Indeno(1,2,3-cd)pyrene	0.049	*	B	S
Naphthalene	194	*	B	S
Phenanthrene	19	*	B	S

Pyrene	10	*	B	S
Pentachlorophenol	7.9	*	B	B
Constituent	**MACL µg/l (2)**	**MACL Source**	**"A" zone Well Monitoring Frequency (5)**	**"C" zone Well Monitoring Frequency (5)**
Benzenethiol	5	*	B	B
Benzyl Butyl phthalate	5200	*	B	B
Bis 2-ethylhexyl phthalate	6	*	B	B
Chromium, dissolved	50	*	B	B
Di-n-butyl phthalate	12000	*	B	B
2,4-dimethylphenol	110	*	B	B
Ethylbenzene	29000	*	B	B
1-methylnapthalene	75	*	B	B
7,12-dimethyl benzo(a)anthracene	X	*	B	B
2-methylphenol	XX	*	B	B
3,4-methylphenol	XX	*	B	B
Phenol	2560	*	B	B
Trichloroethene	381	*	B	B
1,1,1-trichloroethane	62	*	B	B
Chlorobenzene	21000	*	B	B
Methyl chrysene	X	*	B	B
Total Xylenes	13	*	B	B
2-methylnaphthalene	2.1	*	B	B
Acetophenone		*	B	B
Barium	1000	*	B	B
Cobalt	3	*	B	B
Copper	3.1	*	B	B
N-Nitrosopiperidine		*	B	B
Silver	0.19	*	B	B
Vanadium	19	*	B	B
Vinyl chloride	3.8	*	B	B
Appendix IX Parameters (3)				
Metals (Methods 6010,7060, 7470)	N/A	N/A	(4)	N/A
SVOCs (Method 8270)	N/A	N/A	(4)	N/A
VOCs (Method 8260)	N/A	N/A	(4)	N/A

Notes:
* MACLs to be reviewed and updated by the Discharger per Task 14

1. SF Bay Basin Plan, 2010
2. MACL is the maximum allowable concentration limit. Applicable to A-Zone wells only. C-Zone wells evaluated based on background concentrations of inorganic constituents and practical quantization limits for organic constituents.
3. Parameters are listed in Appendix IX to 22CFR 66264 for analysis via Methods 6010, 7060, 7470, 8260, 8270. Appendix IX parameters that are detected, but are not COCs, will be added to the list of COCs for all wells.
4. Bi-annually at POC wells. Every five years at all other wells. Within first year in new wells.
5. Monitoring for COCs and Appendix IX parameters will alternate between highest and lowest groundwater levels.

X=Total PAH concentration less than 0.015 mg/l
XX=Total phenolics concentration less than 0.05 mg/l
PAHS are polynuclear aromatic hydrocarbons
POC is point of compliance
B is biennial or monitoring every other year for non-POC wells
S is semi-annual monitoring at all wells
N/A is not applicable

Appendix M
Richmond Refinery Groundwater Monitoring Program Standard Operating Procedures (March 25, 2015)

RICHMOND REFINERY
GROUNDWATER MONITORING PROGRAM
STANDARD OPERATING PROCEDURES

March 25, 2015

***Prepared for*:**

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FIELD FORMS

Chain-of-Custody/Request for Analysis Form
Purge Log/Sampling Log Sheet
Calibration Log
Example Sample Labels

ACRONYMS AND ABBREVIATIONS

ºC	Degrees Celsius
CPC	Chevron Products Company
DI	Deionized
DTSC	Department of Toxic Substance Control
EMC	Chevron Environmental Management Company
EPA	United States Environmental Protection Agency
HASP	Health and Safety Plan
HPLC	High-Performance Liquid Chromatography
L/min	Liter per minute
MWIMP	Monitoring Well Inspection and Maintenance Program
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NIST	National Institute of Standards and Technology
ORP	Oxidation-Reduction Potential
PID	Photoionization detector
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFA	Request for Analysis
RWQCB	Regional Water Quality Control Board
SOP	Standard Operating Procedure
TD	Total depth
URS	URS Corporation
VOCs	Volatile organic compounds

RICHMOND REFINERY GROUNDWATER MONITORING PROGRAM
STANDARD OPERATING PROCEDURES

1.0 INTRODUCTION

On behalf of Chevron Environmental Management Company (EMC) and Chevron Products Company (CPC), Leidos Engineering, LLC (Leidos) has updated this Standard Operating Procedures (SOP) document for groundwater monitoring activities at the Chevron USA Richmond Refinery (Refinery), located in Richmond, California (Figure 1). Previous versions of this SOP were prepared by URS Corporation (URS, 2002) and Science Applications International Corporation (SAIC, 2004). The groundwater monitoring procedures outlined in this document follow principles of quality assurance (QA), including:

- Support from management and staff;
- Professional expertise;
- Thorough understanding and adherence to Regional Water Quality Control Board (RWQCB), Department of Toxic Substances Control (DTSC), and United States Environmental Protection Agency (EPA) accepted methodologies;
- State-of-the-art instrumentation;
- Use of quality control (QC) samples; and
- Use of high-quality preservatives and spiking solutions.

The applicable components of the third edition of SW-846 are incorporated throughout these procedures, along with the EPA Resource Conservation Recovery Act (RCRA) Groundwater Monitoring Draft Technical Guidance (1992), and Low Flow Groundwater Sampling Procedures (EPA, April 1996), and California Environmental Protection Agency DTSC Representative Sampling of Groundwater for Hazardous Substances, Guidance Manual for Groundwater Investigations (DTSC, 2008). In consideration of SW-846 and EPA's guidance, this document presents procedures for well purging, sampling, record keeping and reporting, laboratory QA, and field QA, which will be followed during all groundwater monitoring activities at the Refinery.

The objectives of the sampling and analysis activities are to:

- Measure groundwater levels from surveyed well casing points;
- Measure hydrocarbon thickness where encountered;
- Collect quality and replica results to evaluate water quality;
- Collect groundwater samples using accurate and up-to-date procedures;
- Accurately document field activities;
- Relinquish samples using proper chain-of-custody procedures;
- Assess trend in the concentrations of contaminants in groundwater; and
- Assess groundwater flow direction.

During field activities, well maintenance needs may be discovered by staff. Monitoring well inspection procedures are detailed in the *Monitoring Well Inspection and Maintenance Program* (MWIMP; Leidos, 2014). The MWIMP presents a formal well inspection program which assigns responsibilities for implementing the MWIMP. It details the physical monitoring well features that are to be documented, assigns responsibilities for ensuring necessary repairs are made, and procedures for documenting the work. Performing the MWIMP work as described will help ensure that representative groundwater data continues to be collected at the Chevron Richmond Refinery. Generalized groundwater monitoring well construction details are shown on Figure 2.

2.0 PURGING

2.1 EQUIPMENT

2.1.1 General Safety Equipment

- Portable barriers/warning lights or cones,
- Calibrated hydrogen sulfide (H_2S; TLV meter) gas monitor,
- Photoionization detector (PID; if volatile organic compounds are suspected to be present),
- First-aid kit,
- Hot-work permit (where required),
- Fire extinguisher, and
- Health and Safety Plan (HASP).

2.1.2 Site-Specific Personal Safety Equipment

- Portable eye wash station.

2.1.3 Protective Clothing

- Boots,
- Safety eyeglasses/goggles,
- Hard hat,
- Gloves (based on task may be leather, chemical resistant, or cut resistant),
- Rain gear (if potentially necessary), and
- Hearing protection (if required in work area).

2.1.4 Transportation

- Pickup truck/sampling truck.

2.1.5 Communication Equipment

- Two-way radio.

2.1.6 Gauging Equipment

- Hydrocarbon/water level interface detector or water-level probe including a 100- or 200-foot-long graduated tape,
- Decontamination materials, and
- Sighting mirror/flashlight or clear bailer with string.

2.1.7 Pumping Equipment

- Purge pumps; centrifugal/submersible bladder, submersible electric with battery, pneumatic pump (dedicated/portable), or peristaltic pump;
- Hoses for pumps; Teflon, Tygon, silicone, polypropylene, or polyethylene;
- Holding tank or containers for purge water;
- Bladder pump controller (compressed air or battery operated);
- Electric pump controller;
- Compressed air cylinders (25 pound); and
- Timer (seconds).

2.1.8 Decontamination Materials

- Container of deionized (DI) water,
- Hexane,
- Lint-free paper towels,
- Phosphate-free detergent, laboratory grade,
- Container of detergent water, and
- Container of tap water.

2.1.9 Documentation Materials

- Ball-point pens or permanent marker,
- Bound field information logs containing polypaper with consecutively numbered pages,
- Current sampling schedule,
- Well location maps,
- Well construction data,
- Field logbook, and
- Field forms.

2.1.10 Test Equipment

- Flow-through cell with combination pH, conductivity, turbidity, dissolved oxygen (DO), temperature and oxidation/reduction potential (ORP) probes, or a combination of meters to measure the same list of water quality parameters;

- pH calibration buffers with pHs of 10.0, 7.0, and 4.0;
- pH paper; and
- Instrument instruction and calibration manuals.

2.1.11 Equipment

All monitoring system equipment and field instruments are inspected and calibrated per the vendor-supplied operating manual. All inspections and calibrations are documented in the calibration logbook. Any repairs that are required are made per the equipment operation manuals and documented in the calibration logbook**.**

2.2 GROUNDWATER AND HYDROCARBON LEVEL MEASUREMENTS

Groundwater elevation measurements are collected semi-annually or quarterly depending on program requirements. Semi-annual measurements should be collected in the fall before the arrival of the winter rains and in late winter or early spring to achieve minimum and maximum water elevations. Water levels should be collected at the monitoring locations in the shortest possible time interval so that data represents a snap shot in time. Water-level data are also collected before sampling or individual well assessment.

- Prior to measurement, verify well ID and location.
- Prior to measurement, water levels in piezometers and wells should be allowed to stabilize after well construction, well development, or well purging. In low-yield aquifers, recovery may take longer than 24 hours.
- Observe and document any potential monitoring well maintenance problems, such as evidence of surface water or other liquid/solid/intrusions into PVC well casing, missing/damaged well caps, lids, locks, well damage, monument or traffic box integrity, and surface seal condition. NOTE: If the well is seriously damaged, report immediately to the manager of the MWIMP. In the interim, and prior to permanent repairs, cover/seal/protect the well as much as feasible to prevent impact to groundwater.
- Water level measurements should be measured to within ±0.01 foot. Water levels should be measured from the surveyed datum on the top of the inner well casing. If no datum point is clearly visible, use the high point of the polyvinyl chloride (PVC) casing. If the top of the PVC casing is relatively level, use directional north as a reference point. Should the datum point not be visible, re-mark where the liquid level is measured from, and record the change in the field log book.
- Observe and document: presence/thickness of any hydrocarbon sheen or odor and visible signs of hydrocarbon presence (current or previous).
- At locations where free-phase liquid hydrocarbons (FPLH) have historically been present, a flashlight or mirror should be used to note if sheen is visible on the top of the water surface before probing. Because the water column should not be disturbed before purging, perform this test after micropurging if the well is dedicated, so the pump is not disturbed.
- At locations where FPLH are known to be present, extend a clean hydrocarbon/water interface detector gently down the well casing to minimally disturb the liquid surface

until it contacts the hydrocarbon surface, if present. A continuous, audible beep will indicate a detectable hydrocarbon layer.

- Read the tape length at the marked surveyed elevation or highest point of the well casing.
- In the same fashion, lower the detector until short-interval beeping occurs beyond the oil/water interface (in water). Raise the probe slowly through the water until a continuous audible beep is heard. This is the water/hydrocarbon interface, or water surface (several attempts may be needed to determine the exact location of the water and free-phase hydrocarbon interface). This measurement is the distance (S) from the top of the well casing to the water surface in the well.
- Alternatively, a clear disposable bailer with clean string can be used to confirm the presence of a thin sheen or unmeasurable thickness of free-phase hydrocarbon. Slowly lower the bailer until contact is made with the water/hydrocarbon surface, and lower the bailer a few inches to 1 foot into the water, then carefully retrieve the bailer to the surface and inspect the sample within the bailer. Discard the water sample and bailer following procedures described in section 2.5.
- Water-level measurement equipment should be decontaminated prior to use at each well to ensure sample integrity and to prevent cross-contamination (see section 2.6).
- Record any depth measurements to the nearest 0.01 foot in the Purge Log/Sampling Log Sheet.
- Clean the measurement equipment after each use according to procedures described in section 2.6 or to manufacturer's instructions.
- The water level measurement equipment will be calibrated annually by comparison to a surveyor's tape. Document calibration in Calibration Logbook.

2.2.1 Groundwater Well Depth Measurement

- Well depth will be determined biennially, except in wells with high turbidity readings. For wells with high turbidity readings (100 nephelometric turbidity units) depths will be determined annually.
- Total well depth will also be measured whenever a pump is removed from a well for maintenance.
- To determine the total well depth (TD), extend the clean water level probe, measuring tape or other measurement device into the well casing until it reaches the bottom. It may take several attempts of bottom-sounding to positively locate the bottom of the well. Do not measure total depth for wells that are to be micropurged or passive purged until after the well is sampled, or at a time independent of sampling event.
- Read the tape at the marked surveyed elevation of the well casing to the nearest one-hundredth of a foot. This is the depth (W) of the well and used in the equations in section 2.3.3.

- Clean the tape and probe after each use according to procedures described in section 2.6 or to manufacturer's instructions.
- Record the depth to well bottom to the nearest 0.1 foot, and whether the total depth sounding is 'soft' bottom or 'hard' bottom on the Purge Log/Sampling Log Sheet, or Water Level Survey Sheet if total depths are measured during the semi-annual water level survey. Any significant changes in total depths recorded from previous events should be documented accordingly in the Field Log Book, and reported to the manager of the MWIMP.

2.3 WELL PURGING

Serial numbers of all equipment used while purging wells should be noted in the field logbook. Calibration logbooks will be maintained, and summarize daily calibration tolerances, maintenance, and other pertinent data. This information will assist operators in determining the overall instrument performance.

2.3.1 Order of Well Purging

Determine sequence for each round of purging. There is no sampling order for wells with dedicated equipment. Wells without dedicated equipment are sampled in order from clean (non-detect) to dirty (most contaminated) based on the most recent groundwater analytical results.

2.3.2 Groundwater Surface Elevation Calculations

Use the following calculations to determine the water surface elevation (H). The well elevation at the top of the well casing (T) and the distance from the top of the well casing to the water surface (S) are the parameters for this calculation. (T) is known from standard well elevation surveys that are done after each well is constructed or modified. (S) is determined from the data obtained by the field sampler or technician. Refer to Table 1, Well Construction Details, for specific well information.

$$H = T - S$$

where:

H = water surface elevation

T = well elevation at the top of the well casing

S = depth to the water surface from top of well casing.

2.3.3 Groundwater Well Purge Volume Calculations

Use the following calculation to determine the volume of water required to purge from a well (non-micropurge wells). Total purge volume is normally considered to be a minimum of three casing volumes. For wells that do not require traditional purging (passive sampling or micropurging), purge volume does not need to be calculated. Record the purge volume on the Purge Log/Sampling Log Sheet.

The casing volume (V) of water to be purged, expressed in cubic feet, is calculated for wells by the following equation:

$$V = \rho r^2 h \qquad (1)$$

where:

r = radius of the well casing (feet)

h = the height of standing water (feet)

$\rho = 3.14$.

Substituting the parameters defined in sections 2.3.2 and 2.3.3 above into the equation and converting volume from cubic feet to gallons, the equation can be expressed as:

$$V = \rho (r^2) (W-S) (7.48 \text{ gal/ft}^3) \qquad (2)$$

where:

$\rho = 3.14$

r = radius of the well casing (feet)

W = depth of well (feet)

S = depth to water surface from top of well casing (feet).

For a standard 4-inch well, the equation for calculating purge volume can be reduced to:

$$V = 0.65 \text{ gal/ft } (W-S) \qquad (3)$$

For a standard 2-inch well, the equation for calculating purge volume can be reduced to:

$$V = 0.16 \text{ gal/ft } (W-S) \qquad (4)$$

The total purge volume is then equal to 3V. In some instances, the total calculated purge volume cannot be obtained because the well recovers so slowly that it goes dry before a total purge volume is removed. In such cases, the well is considered adequately purged at the point when it goes dry. The purged volume is recorded on the Purge Log /Sampling Log Sheet.

2.3.4 Groundwater Purge Rate and Drawdown (Micropurge Wells)

Flow rates of 0.1 to 0.5 liter per minute (L/min) will be used during low-flow purging. These flow rates are dependent on well-specific hydrogeology. All wells will be micropurged unless noted in Table 1 or flow rates are less than 0.1 L/min. If flow rates are less than 0.1 L/min the wells will be passively purged (section 2.4.5).

Drawdown in wells being sampled with low-flow purging should be less than 0.1 meter, or 0.32 foot. This drawdown may be difficult to achieve due to the geology of the site.

2.3.5 Groundwater pH Meter Calibration

- Calibrate the instrument before going to the field, as per manufacturer's instructions.
    a. Follow the vendor's procedures for operation and initial daily calibration of the instrument's electronics.
    b. Use recommended buffers (4.0 and 7.0) to calibrate the probe. Confirm calibration using pH 10.0 buffer solution. Carry an additional buffer in the truck.

c. Replace or recondition any suspect probe.

- Ensure the meter is decontaminated.
- Re-standardize the pH meter in the field with appropriate buffers to bracket the sample pH if there is a suspicion that the calibration of the meter has drifted.
- Confirm pH values with litmus paper to ensure proper operation of meter in the field when necessary. Re-measure pH with a different meter if there is a significant difference. If outside normal specification, then calibrate when necessary.
- Record all calibrations and standardizations on the Calibration Log.

2.3.6 Groundwater Temperature Meter Calibration

Use a calibrated thermometer that is traceable to either the National Institute of Standards and Technology (NIST) or an NIST traceable standard thermometer. Groundwater temperature is measured as an indicator of formation water stability during purging. The instrument should be calibrated before the start of a sampling program. Calibrate as per manufacturer's instructions. Record the calibration information in the calibration logbook.

2.3.7 Groundwater Conductivity Meter Calibration

Groundwater conductivity is measured as an indicator of stability during purging. Before the first well of the day, verify the calibration of the conductivity meter with a known concentration of potassium chloride solution as a standard. This information will provide an indication of the performance capabilities of the conductivity probe.

Replacement or cleaning of the conductivity probe shall be done if the degree of variance is greater than ±10 percent of the above known values, or by manufacturer's recommendations.

Follow the vendor's procedure for temperature correction. Perform re-calibration of the conductivity meter in the field if there is a suspicion that calibration of the meter has drifted.

Record all calibration, temperature, and conductivity measurements (corrected to 25 degrees Celsius [°C]) on the Calibration Log.

All calibration solutions should be labeled with opening date, the name of the person calibrating the equipment, and expiration date (if applicable).

2.3.8 Turbidity Meter Calibration

Turbidity measures the clarity of groundwater samples. Calibration and of the turbidity meter should follow manufacturer's instructions, and the results should be documented on the Calibration Log. Perform a re-calibration of the conductivity meter in the field if there is a suspicion that the calibration of the meter has drifted.

2.3.9 Dissolved Oxygen Meter Calibration

The DO meter measures the amount of DO in the groundwater. Calibration and frequency of calibration of the DO probe should follow manufacturer's instructions, and the results should be documented. The DO probe is a very sensitive measurement. Special care should be taken to maintain equipment and control the measuring medium to reduce possible field variation. Record the calibration information on the Calibration Log. Perform a re-calibration of the meter in the field if there is a suspicion that the calibration has drifted.

2.3.10 Oxidation/Reduction Potential Meter Calibration

ORP or redox potential is a measure of the tendency of a chemical species to acquire electrons and thereby become reduced. Calibration and frequency of calibration of the ORP probe should follow manufacturer's instructions. Special care should be taken to maintain equipment and control the measuring medium to reduce possible field variation. Record the calibration information on the Calibration Log. Perform a re-calibration of the meter in the field if there is a suspicion that the calibration has drifted.

2.4 PURGING PROCEDURES

Refer to Table 1, which identifies well-specific purging requirements. Generally, the purge method for sampling of wells is based on recovery rates. The position of the pump intake is based on the average screen interval, water column, and the geology of the formation (i.e., pump intake should be placed at the first permeable unit within the screen interval).

2.4.1 Pre-Field Preparation

A. Assemble all essential equipment, decontaminated as required, and place in the sampling truck.

B. Prepare the field logbook, field forms, and sample labels in advance, as practicable.

C. Review the day's planned activity.

D. Review groundwater recharge rates for wells to be purged that day.

E. Obtain zone entry authorization(s) and other necessary permits.

F. Check calibration of the personal H_2S air monitor and any other air monitoring instruments if determined necessary. Record all calibration information in the calibration logbook.

2.4.2 Setup for Purging

A. If the well is located in a proprietary area, check with the operating unit's Head Operator before entry, and sign in and out when necessary.

B. Note observations in the well area, including well condition, weather conditions, and well security.

C. If it is actively raining, do not purge "A" Zone or "C" Zone wells without dedicated pumps.

D. Test for H_2S (TLV meter) and hydrocarbon vapors (PID) immediately after opening the well, if necessary, based on history, or if odor is suspected. Note any observations on the Purge Log/Sampling Log Sheet. The H_2S meter should be calibrated by Instrument and Electrical shop at a minimum of once a year. The PID must be calibrated following the manufacturer's instructions before each use.

E. Measure the depth to free-phase liquid hydrocarbon (if any) and groundwater from the marked reference point on the well casing, and record values on the Purge Log/Sampling Log Sheet.

F. Ensure hydrocarbon-producing equipment (generators and vehicles) are not located in close proximity to the well and sampling equipment during purging and sampling. If

nearby operations have the potential to affect groundwater sample quality, stop work, notify the project manager, and prepare to sample at another location.

G. Change gloves before start of purging, and as needed if they become dirty. Gloves should be changed again before collecting groundwater samples.

2.4.3 "A" Zone and "AT" Zone Conventional Well Purging

A. Use a submersible centrifugal pump, peristaltic pump, small-diameter electric pump (for shallow wells to roughly 25 feet), submersible bladder pump, or submersible electric pump.

B. Plan to pump a minimum of three well casing volumes of water from the well into a transportable holding tank or other appropriate container. Wells should be purged at or below their recovery rate, when possible, to prevent damage to the well, avoid disturbing accumulated sediments in the well, and reduce the possibility of stripping volatile organic compounds (VOCs) from groundwater.

C. During purging, groundwater conductivity, pH, turbidity, DO, ORP, and temperature should be measured at equal time intervals, when possible. A minimum of four sets of measurements should be taken unless the well is purged dry. Wells that are purged dry shall be sampled following 80-percent groundwater recovery. If wells do not recover to 80 percent prior to the end of a sampling day, or to the volume of water required for the full requested analytical suite, those wells will be gauged periodically until sufficient volume is present. All purge information will be recorded on the Purge Log/Sampling Log Sheet. Some wells may require sampling 24 hours after purging if recovery is slow.

D. Collect field groundwater samples in clean jars, plastic beakers, or use a flow-through sample chamber. Swirl and discard the first portions. Adjust the readings for temperature (if they are not automatically adjusted), and record values on the Purge Log/Sampling Log Sheet.

E. Continue purging until:

- Three casing volumes of water are removed; and
- Consecutive measurements of conductivity, pH, DO, ORP, turbidity, and temperature indicate formation stability, or the well goes dry (whichever happens first). Three consecutive measurements are considered "stable" when the readings vary as follows:
    - pH +/- 0.1 Units
    - Conductivity +/- 3% mmhos
    - DO +/- 0.3 mg/L
    - ORP +/- 10 mV
    - Turbidity +/- 10% NTU (if less than 10 NTU then +/- 1.0 NTU)
    - Temperature +/- 3% of reading (minimum of +/- 0.2°C)

F. Measure the volume of purged water in the holding tank or other similar container. Volume measurements are to be taken at the same time as groundwater quality parameters and at the end of purging. Purge water containers should be labeled.

G. Drain the non-hazardous purge water into a designated Refinery separator unless otherwise specified based on historical results. If the well has potential or is suspected of containing hazardous levels (based on previous results) of contamination, the water shall be managed through appropriate means. Contact the Refinery Hazardous Waste group for directions.

2.4.4 "C" Zone and "F" Zone Conventional Well Purging

A. Follow steps in section 2.4.1, A through F, and section 2.4.3, A through D.

- If the well has a dedicated bladder pump, set up hoses and controller to purge with compressed air. Follow the vendor's operating instructions.
- If the well does not have a dedicated pump, run a portable (decontaminated) bladder pump, peristaltic pump, or electric submersible pump and tubing down into groundwater to purge. Place the pump near the center of the well screened interval if possible. Follow the vendor's operating instructions.

B. Measure the flow rate from the pump and record it on the Purge Log/Sampling Log Sheet.

C. Follow steps in section 2.4.3, C through G.

D. Place purge water in a holding tank, or other similar container, and then discharge purged water as described in section 2.4.3.

2.4.5 "A" Zone, "AT" Zone and "F" Zone Passive Sampling Purge Instructions

Passive sampling can be performed on wells that historically produced groundwater at a low rate. Unlike traditional purging described in sections 2.4.3 and 2.4.4, passive sampling only requires enough purging to replace the water contained in the pump and hose. No monitoring parameters are required to be collected during purging, but they do need to be collected during sampling, and documented. The pump should be placed in the well 48 hours in advance of sampling if well does not contain a dedicated pump. Passive purging should not be used for Landfarm wells (unless otherwise approved by the DTSC).

A. Follow steps described in sections 2.4.1, A through F.

B. Purge enough water from the well to purge contents of the pump and hose. While purging, adjust pump to sampling rate less than 0.1 L/min. Continue purging at that rate. Do not turn pump off between purging and sampling.

C. During sampling, collect one measurement of conductivity, pH, ORP, DO, turbidity, and temperature, record it on the Purge Log/Sampling Log Sheet.

2.4.6 Micropurge Well Purge Instructions ("A", "C", "AT", and "F" Zones)

Micropurging is a method of purging where groundwater flows through the well screen with sufficient velocity to maintain an exchange with formation water surrounding the screen. The approach involves pumping at much lower flow rates (0.1 to 0.5 L/min) than traditional purging methods. Wells with screen lengths greater than 10 feet should be evaluated to ensure well

hydrology and pump placement are appropriate for micropurging and providing accurate samples.

A. Follow steps in section 2.4.1, A through F.

B. Purge at a rate that matches the flow of water coming into the formation. The flow rate can be determined by the rate in which the groundwater elevation can be maintained without drawdown. Make any necessary adjustments to the flow rate following the removal of the flow-through cell to minimize aeration, bubble formation, and loss of analytes to absorption due to increased residence time in tubing.

   During micropurging, water levels are measured on a continual basis to verify the pump rate. Water levels are recorded at least five times throughout purging on the Purge Log/Sampling Log Sheet as follows: on opening the well, when the well first appears to stabilize, and at least three times thereafter but no less than once every 15 minutes.

C. Continue purging until groundwater parameters (conductivity, temperature, pH, turbidity, and DO) are stable. Parameters will be recorded on the Purge Log/Sampling Log Sheet. Parameters are considered stable when they are within the following tolerances:

   - pH +/- 0.1 Units
   - Conductivity +/- 3% mmhos
   - DO +/- 0.3 mg/L
   - Turbidity +/- 10% NTUs (if less than 10 NTU then +/- 1.0 NTU)
   - ORP +/- 10 mV
   - Temperature +/- 3% of reading (minimum of +/- 0.2°C)

D. Use the same sampling device for micropurging and sample collection. Do not turn off pump between purging and sample collection.

E. Groundwater samples will be collected by opening the Y-fitting in the pump discharge tubing, located between the flow-through cell and the well head (see section 3.5.5).

F. Place purge water in an appropriate container and dispose of properly.

2.5 CLEANING/DECONTAMINATION PROCEDURES (PUMPS AND HOSES)

The following procedures should be followed for all non-dedicated equipment when free-phase hydrocarbons are present:

A. Prepare a solution of phosphate-free detergent according to the manufacturer's instructions.

B. Clean the interior of the pump and hose by running 20 liters of phosphate-free detergent solution through the interior.

C. Pump 40 liters of tap water through the pump and hose.

D. Rinse the equipment with pesticide-grade hexane.

E. Pump 40 liters of DI water through the pump and hose.

F. Clean the outside of the hoses, follow the cleaning procedure in section 2.6.

Record in the field logbook that decontamination of the equipment has been completed in accordance with this SOP.

If hoses are contaminated with free-phase hydrocarbons, they should be wrapped in a plastic bag and properly disposed as hydrocarbon-contaminated material.

The following procedures should be followed for all non-dedicated equipment when free-phase hydrocarbons are not present:

A. Prepare a solution of phosphate-free detergent according to the manufacturer's instructions.

B. Clean the interior of the pump and hose by running 20 liters of phosphate-free detergent solution through the interior.

C. Pump 40 liters of tap water through the pump and hose.

D. Pump 20 liters of DI water through the pump and hose.

E. To clean the outside of the hoses, follow the cleaning procedure in section 2.6.

Record in the field logbook that decontamination of the equipment has been completed in accordance with this SOP. Decontamination fluids will be collected and disposed with other non-hazardous purge water.

2.6 CLEANING INTERFACE PROBE, WATER LEVEL METER, FIELD PARAMETER INSTRUMENTS, AND EXTERIORS OF HOSES

After use in wells that do not contain free-phase hydrocarbons, clean the probes, instruments and hoses as follows:

A. Wash with phosphate-free detergent solution.

B. Rinse with tap water.

C. Rinse with DI water.

D. Dry with lint-free paper towel.

E. Allow all equipment to dry thoroughly in a dust-free environment. Decontaminated sampling equipment should not be placed on the ground or on other contaminated surfaces prior to insertion in the well.

After use in wells with free-phase hydrocarbons, clean the probe, instruments, and hoses as follows:

A. While removing the equipment from the well, wipe it down with a paper towel, or equivalent, to remove gross contamination.

B. Rinse the equipment with pesticide-grade hexane.

C. Wash with phosphate-free detergent solution.

D. Rinse the equipment with tap water.

E. Rinse with DI water.

F. Dry with lint-free paper towel.

G. Allow all equipment to dry thoroughly in a dust-free environment. If the equipment is not to be used again immediately, it should be packaged and properly stored to protect it from dust and dirt. Equipment may be placed in plastic bags. Decontaminated sampling equipment should not be placed on the ground or on other contaminated surfaces prior to insertion in the well. A label should be affixed to the outside wrapping summarizing the decontamination procedure and stating the date of decontamination. Record in the field logbook that decontamination of the equipment has been completed in accordance with this SOP.

Decontamination fluids will be collected and disposed with other non-hazardous purge water.

3.0 GROUNDWATER SAMPLE COLLECTION

3.1 EQUIPMENT

3.1.1 Field Sampling Equipment

- Refinery two-way radios;
- Assorted hand tools;
- Field logbook;
- Assorted supplies: beakers, paper towels, etc.;
- Adequate supply of deionized and tap water for equipment decontamination;
- pH paper, 0-14;
- 0.45 micron filters;
- Solvents: hexane (if necessary);
- Sample containers with seals or caps (see Table 2 for appropriate size and type of container);
- Packaging materials, ice chests with bagged ice;
- Field Forms (Chain-of-Custody/Request for Analysis [RFA], monitoring well sampling data, etc.);
- Flow-through combination meter (pH, DO, ORP, conductivity, turbidity, and temperature) or individual meters to measure the above-listed water quality parameters;
- Hydrocarbon interface probe or water level meter;
- Equipment calibration records; and
- Equipment instruction/calibration manual(s).

3.1.2 Field Safety Equipment

- Personal H_2S (TLV) gas monitor;
- Fire-resistant coverall;
- Site-specific HASP;

- Fire extinguisher;
- Portable eye wash;
- Protective clothing;
- Portable barriers/warning lights or cones;
- PID (if VOCs are suspected to be present);
- First-aid kit;
- Hot-work permit (where required);
- Boots;
- Safety eyeglasses or goggles;
- Hard hat;
- Gloves (based on task may be leather, chemical resistant, or cut resistant);
- Rain gear (if potentially necessary); and
- Hearing protection (if required in work area).

3.1.3 Transportation

- Pickup truck/sampling truck.

3.1.4 Communication Equipment

- Two-way radio.

3.1.5 Laboratory Items (Located at Sample Shipping Center)

- Packaging materials, and
- Adequate supply of sample containers and labels.

3.2 PLACING SAMPLING PUMP IN WELLS WITH FREE-PHASE HYDROCARBONS

If a well containing free-phase hydrocarbon needs to be sampled, the following procedures should be followed to set the dedicated pump and conduct sampling:

A. Obtain a tube or pipe with a larger diameter than the pump and a length equal to or greater than the depth of the well to be sampled.

B. Seal the bottom of the tube/pipe with material that can be punctured.

C. Slowly lower the sealed tube/pipe to approximately 1 foot from the bottom of the well.

D. Slowly lower the pump down the inside of the tube/pipe. When the pump reaches the bottom of the outer tube, puncture the seal. Because of the presence of hydrocarbons, the pump should be set approximately 1 foot off the bottom of the well instead of the standard middle of the well screen.

E. Slowly remove the outer tube/pipe from the well and secure the dedicated pump.

F. Follow the purge methods outlined in section 2.4.

3.3 REAGENTS USED AS PRESERVATIVES

Different analytical methods require different means of preservation (see Table 2 to select the appropriate preservative). Most sampling containers used in the field are pre-preserved by the analytical laboratory. High-quality reagents, pH buffers, and other solutions are purchased from specialty vendors and stored in secured areas. These reagents may include:

- Concentrated nitric acid, high purity;
- Water: High-Performance Liquid Chromatography (HPLC)-grade;
- pH buffers with pH of 10.0, 7.0 and 4.0, certified by vendor;
- Concentrated hydrochloric acid;
- Concentrated sulfuric acid;
- Concentrated phosphoric acid;
- Copper sulfate crystals;
- Sodium hydroxide pellets; and
- Zinc acetate solution.

All reagents should be separated into storage areas by type (acid and bases) and labeled to include date received and opened by who (initials).

Reagents are often included in laboratory-prepared bottles.

3.4 SAMPLE CONTAINERS

Use clean containers for all sampling. Commercially cleaned containers, meeting EPA guidelines, are currently obtainable from vendor and contract laboratories. All containers used in this program will be provided by the contract analytical laboratory. Laboratory-supplied containers will be pre-preserved, or provide instruction for the addition of reagents and preservatives.

3.5 SAMPLE COLLECTION

3.5.1 Pre-Field Preparation

A. Plan and review activities, and health and safety requirements, with the sampling team.

B. Assemble all essential equipment, decontaminated as required, and place in the sampling truck.

C. Prepare the field logbook, field forms, and sample labels in advance, as practicable.

D. Bring Chain-Of-Custody/Request-for-Analysis forms (see section 4.3 for details). Note the designated sample IDs in the field log and on the sample labels.

E. Obtain zone entry authorization(s) and other necessary permits.

F. Clean sample containers should be sealed and stored in a clean environment to prevent accumulation of dust or other contaminants. If in doubt, discard bottles and acquire clean sample containers from the laboratory service center.

3.5.2 At the Well Site, Before Sampling

- Do not sample any time when sample integrity may be jeopardized, i.e., when raining, blowing dust, painting, or welding activities are occurring nearby.

3.5.3 Initial Water Level Measurements

A. Measure the depth to groundwater or free-phase hydrocarbon surface (if any) from the top of the well casing following the procedures in section 2.2.

B. Wells containing greater than 0.01 foot of free-phase hydrocarbon should not be sampled for groundwater analysis unless required per RWQCB Orders R2-2011-0036 or R2-2012-0015 or the DTSC Hazardous Waste Facility Landfarms Post-Closure Permit.

3.5.4 Sampler Type

- Wells are purged using the procedures outlined in sections 2.4.3 through 2.4.6, and groundwater samples are collected immediately at the conclusion of purging using the same equipment.

3.5.5 Collecting Groundwater Samples

- Before sampling, change gloves to avoid cross-contamination from the gloves used for setup and purging.
- All unnecessary equipment, particularly any gasoline-powered equipment, will be shut off in the vicinity of the well being sampled.
- Groundwater samples will be collected by opening the Y-fitting, located in the pump discharge tubing between the flow-through cell and the well head, without interrupting flow.
- For slow recharge wells that take more than 2 hours for a sufficient volume to recover, samples for volatile organic analysis (VOA) will be collected first on recovery of a sufficient volume to sample, and the remaining required parameters collected as additional water accumulates for adequate sampling.
- Sample bottles containing preservatives will not be overfilled during sample collection.
- Use the information obtained from the well recovery rate for future sampling information to establish a work schedule and purging rates.
- Check valves and hoses should be designed and inspected to ensure that fouling problems do not reduce delivery capabilities or result in aeration of samples.
- Sampling equipment should never be dropped into the well, as this may cause degassing of the water on impact.
- Groundwater samples should be transferred from sampling equipment to sample containers in a controlled manner that will minimize sample agitation and aeration. Wells should be purged at flow rates below the flow rates used to develop the wells. Low sampling flow rates (less than 1 L/min = 0.26 gallon per minute) are suggested for wells with high turbidity. The low sampling flow rates will help to ensure that particulates, immobile in the subsurface under ambient conditions, are not entrained in the sample and volatile compounds are not stripped from the sample.

- Pump lines should be cleared at a rate of 0.5 L/min or less before collecting samples for volatile analysis so that the samples collected will not be from the period of time when the pump was operating more rapidly. Sampling rates should be the same or slower than purge rates for wells being micropurged or passively sampled.
- Pumps should be operated in a continuous manner so that they do not produce samples that are aerated on discharge.
- Collect samples in order of analyte volatility (see Table 2).
- Measure the turbidity in the field from the first set of samples. Record the turbidity in the Purge Log/Sampling Log Sheet. Follow the vendor's directions for proper operation of test equipment.
- For filling VOA vials from a bailer, bladder, or centrifugal pump outlet, hold the end of the sample tubing at or near the bottom of the sample container to minimize turbulence and potential loss of volatile compounds.
- To reduce loss of volatile organic compounds, use the lowest reasonable bladder pump flow-rate setting when collecting samples for analysis of total petroleum hydrocarbons, aromatic hydrocarbons, total organic carbon, solvents, phenolic compounds, and other volatile organics.
- Samples to be analyzed for volatile organics should be filled to the top of the bottle, directly from the bailer or pump outlet. Samples must not be agitated during this process. Cap and seal all bottles, leaving no air bubbles inside.
- Collect the samples in the appropriate containers (see Table 2) and required sample volume.
- Regardless of the analytes of concern, exposure of the samples or open sample containers to the ambient air should be minimized.
- To minimize the possibility of volatilization of organic constituents, no headspace should exist in the containers of samples collected for VOA. Immediately after samples designated for VOA have been filled and capped, they should be checked for headspace. In most cases, the entire sample should be emptied from the container and the container should be refilled if headspace is noted in the sample. In no case should a sample container with preservative be refilled; a new clean container with preservative must be used. Containers should not be "topped off" to fill the additional headspace. If headspace is observed after samples have been collected, field logbooks and laboratory analysis reports should note the headspace.

3.5.6 Filtering

- All samples collected for analysis of metals will be filtered in the field before preserving.
- Samples will be filtered through a 0.45-micrometer filter.
- An in-line disposable filter will be used at each well and then discarded.
- The sample label and field notes must reflect that the sample was filtered in the field.
- The manufacturer of the filters and any certificates of purity should be kept on file.

- Filters should be flushed with groundwater (see filter recommendation for recommended flushing time) before sampling (the groundwater will be collected and disposed with the purge water).

3.5.7 Preservatives

- Use pre-preserved sample bottles in most sampling situations. If pre-preserved sample containers are not available, add preservatives to sample containers immediately in the field prior to filling with groundwater. Table 2 lists the appropriate preservative to be used. Some samples will require additional preservative for proper preservation. Check the sample pH and add preservative as needed.
- Transfer preservatives from the respective containers to the sample container a drop at a time, using dedicated eyedroppers. If a dedicated dropper is not available, use only new, clean, disposable droppers provided by the contract analytical laboratory. Check the pH frequently, and add no more preservative than necessary.
- When using pH paper, pour a small amount of sample onto the pH paper. Do not check the pH from the sample container.
- If a sample begins to bubble or foam in the presence of the acid preservative, resample and do not add preservative. Mark the sample label and Chain-of-Custody "NO PRESERVATIVE ADDED". Notify the laboratory so provisions for rapid analysis can be made.

3.5.8 Documentation

- Record the number of samples taken and preservatives used on the Chain-of-Custody/RFA form and the sample labels.
- Record the sample ID number on the sample label and in the field logbook. Labels will be completed legibly and in permanent marker or pen. Labels will be applied to dry sample containers immediately following sampling, and prior to samples being placed in coolers containing ice.
- Sample numbers comprised of the following format:

Example: 071504674CFS

- Digits 071504 refer to the date.
- Digits 674C identify the well.
- FS refers to Field Sample. FD, MS, TB, EB, FB represent Field Duplicate, Matrix Spike (MS), Trip Blank, Equipment Blank, and Field Blank, respectively.

3.5.9 Handling and Transportation

A. Immediately after collection of the sample and labeling, place the sample in a cool sample chest with ice.

B. At the end of each field day, transport the samples to the contract lab (currently Eurofins Analytical located at the Hensley Street facility) for shipping.

C. No samples in need of 24 to 48 hour extraction will be collected on Fridays or immediately preceding holidays.

D. QC and inventory of all samples collected will be verified visually and physically by the personnel having collected the samples and by personnel signing for receipt of samples prior to exchanging custody.

3.6 PACKING PROCEDURES

Groundwater samples brought in from the field must be kept cold (4°C) until they are ready to be tested. All samples should be packed in insulated coolers or ice chests packed with ice. As the samples are placed in the chest, each sample container should be checked against the chain-of-custody form for that batch of samples. Any discrepancies identified by the analytical laboratory may result in delays in analysis of the samples. Also, if you do not include enough groundwater samples for the list of requested analyses, the lab may not be able to perform all of the necessary analyses.

- If the person packing the groundwater samples is not the same person who collected the samples, the sample collector must relinquish the samples to the sample packer by signing the chain-of-custody form. The packer must also sign the chain-of-custody form acknowledging the samples are now in the packer's custody.
- After placing the samples in the chest, put an adequate supply of ice in the chest to keep the samples at 4°C until they reach the lab. The chest should then be filled with adequate packing material to prevent glass containers from breaking during transit. If there are no glass bottles in the sample shipment, less packing material is needed.
- As specified in Chapter One of SW-846, a temperature history of the samples should be maintained as a quality control measure. This is done by putting a temperature blank in the cooler and recording the temperature on the chain-of-custody form before samples are sealed for shipment. On receipt of the shipment, the laboratory should record the temperature on the chain-of-custody record. In addition, temperature records should be maintained in any storage facility that contains the samples. All thermometers should be certified yearly.
- Place the original copy of the chain-of-custody form in a re-sealable plastic bag and place in the cooler with the samples.
- Close the lid of the packed chest and securely tape it down so it cannot open during transit.
- Two-inch-wide duct tape or clear strapping tape is recommended. After taping, fill out two custody seals and place them across the gap between the lid and body of the chest. Place the seals in such a way so the chest cannot be opened without breaking them.
- If the sample chest does not already have a Refinery return address label on it, place one on the lid of the chest.

4.0 RECORDKEEPING AND REPORTING

4.1 FIELD LOGBOOK

Maintain a written record of all sampling information in the field logbook. The field logbook must contain consecutively numbered, bound, and water-resistant pages.

4.1.1 Data Entry

- Enter all data in black ink.
- If a correction is necessary, cross out the initial entry (with a single line) and write the correction beside it with your initials and date.
- Do not use correction fluids.
- Use of ditto marks (“ ”) on records is not permitted.
- Annotate year, project, etc., on the outside of the log.
- Do not remove or cut out any pages from a field logbook.

4.1.2 Information to be Recorded

If a sample analysis produces an unexpected or unexplainable result, it will be necessary to determine if the circumstances of sample collection, rather than a change in the groundwater quality are responsible. Examination of the field logbook is critical in this process. A field logbook should be kept each time groundwater monitoring activities are conducted. All information, including name, date, descriptions, problems, and actions taken to solve problems must be written out in detail. Any deviations from the SOP will be noted in the logbook, and/or the Purge Log/Sampling Log and described in the appropriate monitoring report.

Record in the field log and the Purge Log/Sampling Log, the Calibration Log, or the Chain of Custody all of the following information:

- Well identification,
- Well depth,
- Static water level depth and measurement technique,
- Presence and thickness of immiscible layer,
- Well purging procedure and equipment,
- Purge volume and pumping rate,
- Date and time well purged,
- Date and time of collection,
- Types of sample bottles used and sample identification numbers,
- Preservatives used,
- Parameters requested for analysis,
- Equipment Calibration,
- Field observations of sampling event,
- Name of collector,
- Weather conditions, including air temperature,
- All field personnel present,

- Start time,
- Information on QC samples,
- Description of equipment used and serial numbers,
- Information on miscellaneous events or circumstances, and
- Temperature of the temperature blank.

Each entry must be appropriately signed and dated by the individuals making the respective entries. Any well maintenance issues should also be documented and the information provided to the manager of the MWIMP (Leidos, 2014).

4.2 CUSTODY

4.2.1 Definition of Custody

A sample is considered to be under a person's custody if it meets one of the following conditions:

- In a person's physical possession,
- In view of the person after he has taken possession,
- Secured by that person so that no one can tamper with the sample without his knowledge, and
- Secured under lock and key by that person in an area that is restricted to unauthorized personnel.

QC and inventory of all samples collected will be verified visually and physically by the personnel having collected the samples and by personnel signing for receipt of samples prior to resigning/accepting custody.

4.3 CHAIN-OF-CUSTODY RECORD/REQUEST FOR ANALYSIS FORM

A chain-of-custody record must be filled out and accompany each sample from its origin to its final destination. Examples of the chain-of-custody record and RFA forms are provided in the list of Field Forms.

4.3.1 Procedure for Completing Chain of Custody

Every chain-of-custody record must show the following information

- Sample ID number, which must be a neutral number;
- Number, size, and type of containers of each sample;
- Type of sample and field information;
- Analyses requested;
- Signature of sample collector;
- Date and time of collection;
- Place and address of collection;

- Signatures of every person, in sequential order, involved in handling the sample(s) sequence of possession;
- Inclusive dates of possession at the Refinery and analysis laboratory; and
- Indicate if samples were filtered or preserved.

If there are sample sets on the chain-of-custody record that are not to be tested for the full analysis requested list, the specific analysis changes for those samples must be carefully footnoted on the chain-of-custody record. The EPA has specifically noted in the Technical Enforcement Guidance Document that the use of ditto (“ ”) marks is not permitted at any time on an environmental sample chain-of-custody record. The correct way to fill out a chain-of-custody record is to write out each entry, even if the information is repetitious.

The RFA form is combined with the Purge Log/Sampling Log, and includes:

- Name and address of the laboratory receiving the sample,
- Sample collector’s name,
- Contact person,
- Special handling information, and
- Analyses to be performed (including method number and analytes).

4.4 OFFICIAL SAMPLE LABELS

Official sample labels are necessary to prevent misidentification of samples. An example of the official sample label is included in the list of Field Forms. On water-resistant, gummed polypaper, the following information must be recorded:

- Sample date,
- Sample time,
- Sample location (Refinery),
- Sample ID,
- Collector’s name,
- Preservative used,
- Refrigeration requirement (chill to 4°C), and
- Analysis instructions.

If any samples were filtered in the field, this must also be noted on the sample label. Sample labels are prepared by the sampler.

4.5 SAMPLE OR SHIPPING CONTAINER SEALS – IF SAMPLER IS SHIPPING SAMPLES OR LEAVING SAMPLES UNATTENDED

Each sample or shipping container must have seals attached in such a way that they must be broken or torn in order to remove the sample. Attach the chain-of-custody record to the ice chest. The waterproof, gummed polypaper seal must show the following information:

- Date and
- Number of chests (if there are more than one ice chest); and attach the chain-of-custody record to the ice chest.

4.6 DATA MANAGEMENT SYSTEM

4.6.1 Field Data

Data collected in the field by samplers are currently entered into the LOCUS environmental information management system database. Other databases may be used in the future for data management.

4.6.2 Laboratory Data

Sample analysis results are received from contract laboratories in electronic format.

Electronic copies of sample analytical results, chains-of-custody forms, and sample collection information are filed and archived for a period of at least 11 years, or unless otherwise specified. Additionally, electronic copies of analytical data are also retained by the contract laboratories that performed the analyses in accordance with laboratory accreditation guidelines.

Laboratory field log books not currently in use by well samplers are in the possession of the sampling program project manager.

5.0 LABORATORY QUALITY ASSURANCE

Chevron contract laboratories maintain the highest standards for RCRA groundwater monitoring. All analyses except for field testing (pH, conductivity, DO, ORP, temperature and turbidity) are conducted at a State Water Resources Control Board Environmental Laboratory Accreditation Program accredited laboratory. All laboratories are expected to meet conditions outlined in sections 5.1 and 5.2.

5.1 LABORATORY SAMPLE CUSTODIAN

A. In the laboratory, a sample custodian receives the samples, inspects the samples and sample seals, reconciles information on the Official Sample Label and Seal against that on the chain-of-custody/RFA record, logs the sample in a database, and stores the sample until analysis.

B. The sample custodian will inspect the temperature blank on receipt of the samples and record the temperature of the samples on the chain-of-custody record.

C. The sample custodian inspects the sample containers for leakage or any internal pressure that could be hazardous and cause possible loss of portions of the sample. Any discrepancies in information found on labels, seals, or chain-of-custody records are resolved before testing. Resolution of discrepancies requires communication between laboratory supervisors, sample collectors, laboratory custodians, project managers, and any others involved in the monitoring program needed to resolve the issue.

D. The laboratory custodian assigns a unique identification number to the sample. This is the contract laboratory's identification number under which all work on the respective sample is filed.

5.2 QUALITY CONTROL

The following are essential for the laboratory's bench-level QC program:

- Parameter spikes, minimum of 5 percent of all samples;
- MS, minimum of 5 percent of all samples;
- Replicates of samples and spikes, minimum of 10 percent of all samples;
- Lab control and blank samples processed with each analytical batch;
- Control charts on critical parameters;
- Corrective action program;
- Two levels of data;
- Systematic review by a QA Officer;
- Access to professional support;
- QA/QC surveillance over all subcontracted work under the same rules and guidelines expected of them; and
- Several types of logs maintained, e.g.:
    - Sample logs,
    - Instrument logs,
    - Calibration and Tuning logs, and
    - Maintenance logs.

6.0 FIELD QUALITY CONTROL PROGRAM

In order to establish the credibility of the sampling/analysis program, field QC samples must be submitted along with the groundwater samples. QC sample results will have direct bearing on sample results and will help establish the credibility of the sampling program. A good QC record can be cited to support the results submitted to the regulatory agencies. Field QC samples must be submitted blind to prevent possible laboratory bias.

Field QC samples consist of blanks and duplicate samples. Field QC samples are used as a QA check of the laboratory and a QC check of the field procedures. In addition, laboratory quality control samples are collected in the field for the laboratory to perform MS. Laboratory MS provide an indication of the sample matrix interfering with the analytes.

6.1 BLANKS

Blank samples are collected in two forms: trip blanks and equipment blanks. Certified HPLC-grade water is used as the matrix of the blank samples.

6.1.1 Trip Blanks

Trip blanks are laboratory-certified blanks that are transported along with the samples on a daily basis. The blank samples are 40-milliliter VOA vials that are filled at the laboratory and certified by batch. The trip blanks are stored in the contract laboratory groundwater sample

refrigerator. Two trip blanks per cooler are transported to the site and remain with the samples at all times. The trip blanks provide data to evaluate whether VOC contamination was introduced during sampling, storage, or shipment.

6.1.2 Equipment Blanks

Equipment blanks are collected when non-dedicated sampling devices are used. An equipment blank is a sample of HPLC-grade water run through the decontaminated sampling equipment and into the sample containers while at the well site. Equipment blanks must be submitted for each analyte of interest at a rate of one blank per sector if non-dedicated equipment was used. The equipment blanks are submitted blind to the laboratory. When false positives are reported, they can be taken into account when evaluating sample result data.

6.1.3 Field Blanks

Field blanks are taken to assess the potential contribution of airborne contaminants present in ambient air to environmental samples being collected. Prior to sampling efforts, the monitoring program project manager randomly chooses which wells will have field blanks. Field blanks may also be selected in the field if there is some activity that could potentially cause sample contamination. Field blanks are prepared in the field with HPLC water. During the sampling event the sampling team removes bottles from the cooler, opens each bottle cap, and exposes water in the bottle to ambient conditions for a period of time. Field blanks should be collected at a frequency of at least one sample per every 20 wells sampled.

6.1.4 Temperature Blanks

Temperature blanks are collected to ensure the samples are being stored at the correct temperature. The temperature blank consists of a thermometer in a pre-sealed VOA vial containing distilled water. The temperature blank is placed in the cooler prior to sample collection and stays with the cooler until the samples are delivered to the laboratory. The temperature of the temperature blank is recorded in the field logbook prior to beginning sample collection by the technician, and again when the samples are delivered to the laboratory.

The temperature of the cooler should be maintained at 4±2°C. If the temperature of the blank is observed to be greater than the above range, then more ice will be added to the cooler.

6.2 DUPLICATES

Duplicate samples are used to monitor the variance in analytical results due to sampling and analysis procedures. Duplicate samples are collected concurrently with the well samples (i.e., sample for petroleum hydrocarbons is collected, and then the duplicate sample for petroleum hydrocarbons is collected). Duplicate samples must be submitted at a frequency of at least one sample per every 20 well samples. Duplicate samples should be collected at wells with known or suspected contamination in order to get meaningful results.

Duplicate samples are chosen based on the following:

- Recovery rates (i.e., is there enough water in the well to collect a double-quantity sample?);
- If laboratory data from the previous sampling event indicated suspect results, then a duplicate sample is collected the following quarter; or
- Randomly.

6.3 LABORATORY QUALITY CONTROL SAMPLES

Laboratory spiked samples are used to measure the relative accuracy of the analysis under controlled laboratory conditions. A spiked sample is a sample in which a known amount of an analyte has been added. Two extra sample sets should be collected at a rate of one per batch of 20 well samples. The samples should be labeled "MS" and "MSD" (matrix spike duplicate). "MS" and "MSD" should also be clearly indicated on the chain-of-custody form.

MS/MSD samples are chosen based on the following:

- Recovery rates (i.e., is there enough water in the well to collect a double-quantity sample?); or
- Randomly.

7.0 REFERENCES

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Figures

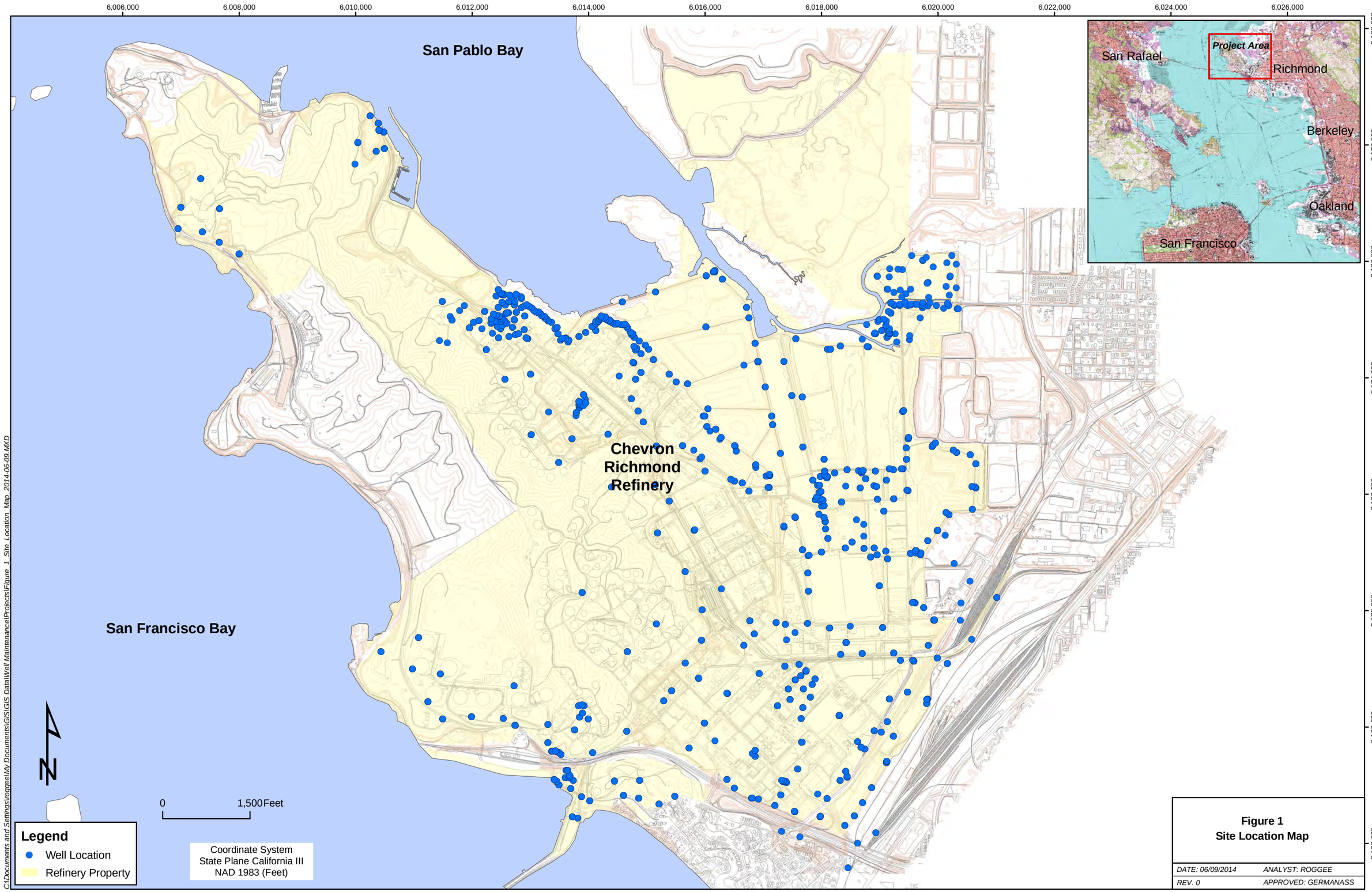
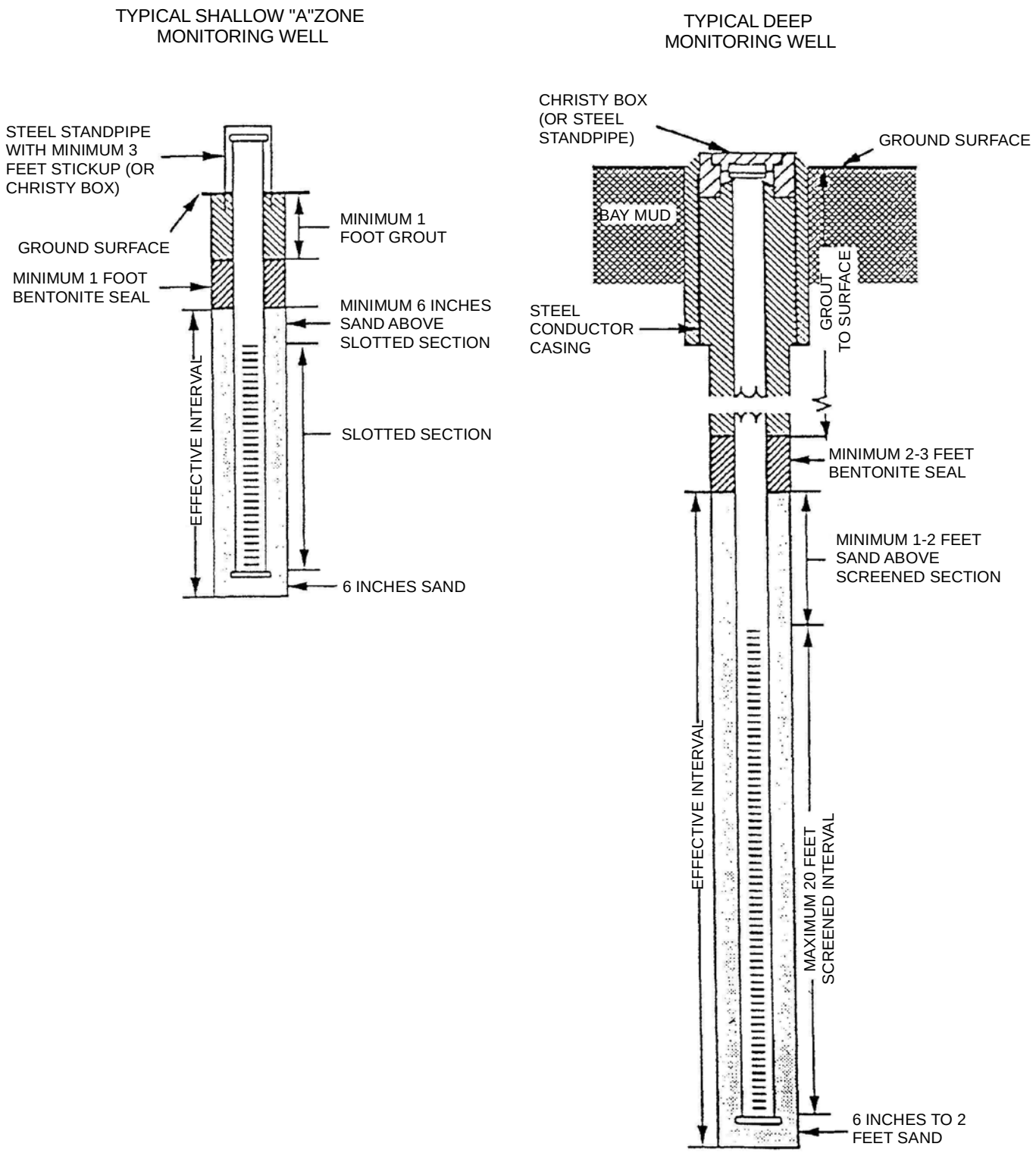


Figure 1
Site Location Map

DATE: 06/09/2014	ANALYST: ROGGEE
REV. 0	APPROVED: GERMANASS



leidos

Figure 2
Examples of Typical Monitoring Wells

DATE: 5/29/2014	*ANALYST: EHR*
REV. 0	*APPROVED:*

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Tables

Table 1
Well Construction Detail

Sector	Well	Pump Type	GS Elevation	Top of Well Casing Elev.	Total Depth from GS	Casing Diameter	Elevation Top of Screen	Elevation Bottom of Screen	Screen Length	Calculated Well Depth from TOC	Pump Intake Depth from TOC	Purge Type
Pollard Sector	260A	Bladder	7.92	9.52	22.0	4"	-4.08	-14.08	10	23.60	18.6	Micro Purge
	262A	Bladder	7.26	7.61	18.5	4"	-1.74	-11.24	9.5	18.85	13.3	Micro Purge
	P686A	Peristaltic	10.63	13.59	25.0	2"	0.63	-14.37	15	27.96	20.5	Micro Purge
	P687A	Peristaltic	9.90	12.95	25.0	2"	-0.10	-15.10	15	28.05	20.6	Micro Purge
	P688A	Peristaltic	11.36	10.90	25.0	2"	1.36	-13.64	15	24.54	17.0	Micro Purge
	635C	Bladder	9.61	12.16	41.2	4"	-24.39	-31.39	7	43.75	40.3	Micro Purge
	803A	Bladder	34.00	34.97	40.0	4"	12.00	-3.00	15	40.97	33.4	Micro Purge or Passive Purge
Alkane Sector	670C	Bladder	11.49	14.69	47.0	2"	-30.51	-35.51	5	50.20	47.7	Micro Purge
	209A	Bladder	5.72	8.89	13.0	4"	2.72	-7.28	10	16.17	11.9	Micro Purge or Passive Purge
	223C	Bladder	6.68	9.84	50.0	4"	-36.32	-43.32	7	53.16	48.4	Micro Purge
	375C	Bladder	16.62	18.01	82.5	4"	-53.38	-63.38	10	83.89	77.3	Micro Purge
	595AT	Bladder (Short)	11.53	13.69	12.5	4"	7.53	-0.97	8.5	14.66	10.6	Micro Purge
	P460A	Bladder (Short)	10.45	12.77	16.0	4"	7.45	-4.55	12	18.32	12.4	Micro Purge
	167A	Portable Bladder	14.70	13.93	14.0	4"	10.70	0.70	10	13.23	9.8	Micro Purge
	170A	Portable Bladder	16.05	16.74	14.0	4"	12.05	2.05	10	14.69	8.3	Micro Purge
	174A	Portable Bladder	18.00	17.55	15.8	4"	12.20	2.20	10	15.80	10.4	Micro Purge
	200A	Portable Bladder	16.33	16.14	14.0	4"	12.33	2.33	10	13.80	8.8	Micro Purge
	201A	Portable Bladder	9.99	9.03	13.0	4"	6.99	-3.01	10	12.04	7.0	Micro Purge
	258A	Portable Bladder	9.80	12.23	25.0	4"	4.80	-10.20	15	27.43	14.9	Micro Purge
Interior "C" Zone	208C	Bladder	14.82	16.01	60.8	4"	-30.99	-45.99	15	61.94	53.0	Micro Purge
	638C	Bladder	17.00	18.76	42.5	2"	-15.50	-25.50	10	44.26	40.0	Micro Purge
	378C	Bladder	13.19	15.15	54.0	4"	-29.81	-39.81	10	55.96	52.0	Micro Purge
	379C	Bladder	12.25	14.67	41.5	4"	-16.25	-26.25	10	43.92	36.0	Micro Purge
	380C	Bladder	10.20	12.52	35.5	4"	-12.80	-22.80	10	37.82	31.6	Micro Purge
	138C	Bladder	10.16	11.03	60.0	4"	-43.84	-49.84	6	60.87	57.9	Micro Purge
	382C	Bladder	10.55	12.93	37.5	4"	-14.45	-24.45	10	39.88	38.0	Micro Purge
Effluent Sector	108A	Bladder (Short)	8.32	9.61	21.5	4"	4.82	-13.18	18	22.79	16.0	Micro Purge
	164A	Bladder (Short)	9.56	9.11	13.3	4"	5.26	0.56	4.7	12.85	10.0	Micro Purge
	179A	Bladder (Short)	9.20	8.62	15.0	4"	5.20	-4.80	10	14.42	8.9	Micro Purge
	108C	Bladder	8.20	11.12	104.0	4"	-74.80	-94.80	20	106.92	97.0	Micro Purge
	164C	Bladder	9.39	8.78	61.0	4"	-30.61	-50.61	20	60.39	50.0	Micro Purge
North Yard Sector	550A	Bladder (Short)	9.39	8.71	19.0	4"	5.39	-9.61	15	18.32	14.0	Micro Purge
	377C	Bladder	12.14	13.98	140.0	4"	-113.86	-123.86	10	141.84	134.0	Micro Purge
	178C	Bladder	11.23	10.92	76.5	4"	-42.77	-62.77	20	76.19	68.0	Micro Purge
	671A	Bladder (Short)	6.50	8.44	13.0	4"	3.50	-6.00	9.5	14.93	11.5	Micro Purge
	675A	Bladder (Short)	10.94	10.38	15.5	4"	3.94	-6.06	10	12.94	14.7	Micro Purge or Passive Purge
Castro Sector	323A	Bladder (Short)	12.20	11.44	10.0	2"	10.20	2.20	8	9.24	9.3	Micro Purge or Passive Purge
	642A	Bladder (Short)	9.18	11.35	7.0	4"	6.18	2.18	4	9.17	9.6	Micro Purge
	554A	Bladder (Short)	7.70	7.13	5.0	4"	6.50	2.70	3.8	4.43	4.5	Micro Purge
	556A	Bladder (Short)	8.73	8.37	4.0	4"	6.73	4.73	2	3.64	3.5	Micro Purge or Passive Purge
	106C	Bladder	10.81	13.00	81.5	4"	-49.19	-69.19	20	83.69	71.3	Micro Purge
	125C	Bladder	9.39	11.99	44.0	4"	-25.61	-33.61	8	46.60	42.5	Micro Purge
	320C	Bladder	7.90	7.31	40.5	2"	-17.60	-32.60	15	39.91	32.4	Micro Purge
	649A	Bladder	9.02	11.54	8.0	4"	6.02	1.02	5	10.52	10.6	Micro Purge
Landfill 15	232A	Bladder (Short)	8.05	9.52	14.5	4"	5.05	-4.95	10	16.09	9.3	Micro Purge
	233A	Bladder (Short)	7.53	9.20	13.0	4"	5.03	-4.97	10	14.67	9.5	Micro Purge
	234A	Bladder (Short)	7.82	9.51	14.5	4"	4.82	-5.18	10	16.44	11.0	Micro Purge
	240A	Bladder (Short)	5.52	7.35	6.5	4"	3.02	-0.98	4	8.33	6.5	Micro Purge or Passive Purge
	551A	Bladder (Short)	9.70	9.07	15.0	4"	4.70	-5.30	10	14.37	10.5	Micro Purge
	552A	Bladder (Short)	7.90	10.18	13.5	4"	4.40	-5.60	10	15.78	11.0	Micro Purge
	232C	Bladder	8.07	10.33	45.0	4"	-24.93	-34.93	10	47.26	41.3	Micro Purge
	234C	Bladder	8.54	9.86	47.0	4"	-26.46	-36.46	10	48.32	42.5	Micro Purge
	235C	Bladder	9.85	9.58	41.0	4"	-20.15	-30.15	10	40.73	35.0	Micro Purge

Table 1
Well Construction Detail

Sector	Well	Pump Type	GS Elevation	Top of Well Casing Elev.	Total Depth from GS	Casing Diameter	Elevation Top of Screen	Elevation Bottom of Screen	Screen Length	Calculated Well Depth from TOC	Pump Intake Depth from TOC	Purge Type
	236C	Bladder	11.54	12.71	61.5	4"	-38.96	-48.96	10	62.67	57.9	Micro Purge
Landfarm Post Closure	678C	Bladder	9.08	11.90	67.0	2"	-47.92	-57.92	10	69.82	65.4	Micro Purge
	183A	Bladder (Short)	12.99	13.74	13.7	4"	11.49	-0.51	12	14.45	10.0	Micro Purge
	679C	Bladder	12.46	15.36	50.0	2"	-27.54	-37.54	10	52.90	48.4	Micro Purge
	251C	Bladder	10.96	13.53	53.0	4"	-32.04	-42.04	10	55.57	51.1	Micro Purge
	P284A	Bladder (Short)	8.81	10.31	16.2	4"	7.81	-7.19	15	17.70	13.0	Micro Purge
	P384A	Bladder (Short)	8.50	11.28	12.0	4"	6.50	-3.50	10	14.78	11.0	Micro Purge or Conventional Purge
	P386A	Bladder (Short)	10.82	10.13	16.0	4"	8.32	-5.18	13.5	15.31	10.0	Micro Purge
	506C	Bladder	15.20	17.78	39.0	4"	-17.80	-23.80	6	41.58	39.6	Micro Purge
	587C	Bladder	9.95	12.48	60.0	4"	-40.05	-50.05	10	62.53	57.7	Micro Purge
	610A	Bladder (Short)	9.79	9.51	13.0	4"	6.79	-3.21	10	12.72	9.5	Micro Purge
	645A	Bladder (Short)	12.58	15.21	17.0	4"	5.58	-4.42	10	19.36	14.1	Micro Purge
	654C	Bladder	9.76	11.47	35.0	4"	-15.24	-25.24	10	36.71	31.1	Micro Purge
	655C	Bladder	9.24	10.73	40.0	4"	-20.76	-30.76	10	41.49	36.0	Micro Purge
	680C	Bladder	8.03	11.06	40.0	4"	-21.97	-31.97	10	43.03	38.4	Micro Purge
	657A	Bladder (Short)	11.54	14.00	14.0	4"	7.54	-2.46	10	16.46	15.5	Micro Purge
	677A	Bladder (Short)	9.33	12.43	16.0	4"	3.33	-6.67	10	19.10	13.0	Micro Purge
	659A	Bladder	11.02	13.29	18.0	4"	8.02	-6.98	15	20.27	19.0	Micro Purge
	672A	Bladder (Short)	9.39	11.82	17.0	4"	2.39	-7.61	10	19.43	14.8	Micro Purge
	673A	Bladder (Short)	11.87	14.53	17.0	4"	4.87	-5.13	10	19.75	14.7	Micro Purge
	674C	Bladder	10.68	13.20	40.0	2"	-20.32	-29.32	9	42.52	28.6	Micro Purge
Reclamation Yard GPS	370A	Bladder (Short)	8.67	10.87	9.7	4"	5.17	-1.03	6.2	11.90	8.8	Micro Purge
	369S	Bladder	9.75	11.46	19.0	4"	-3.25	-9.25	6	20.71	17.5	Micro Purge
	564A	Bladder (Short)	7.99	9.89	8.0	4"	5.49	-0.01	5.5	9.90	7.4	Micro Purge
	685C	Bladder	17.34	19.81	68.0	2"	-45.16	-48.16	3	70.47	65.0	Micro Purge
	569C	Bladder	12.41	14.15	51.0	4"	-28.59	-38.59	10	52.74	0.0	Micro Purge
	643A	Bladder	8.67	10.95	12.0	4"	5.67	-3.33	9	14.28	10.0	Micro Purge
	238C	Bladder	7.44	10.32	32.0	4"	-19.56	-24.56	5	34.88	32.6	Micro Purge
	560A	Bladder (Short)	6.90	9.03	10.0	4"	3.90	-3.10	7	12.13	8.6	Micro Purge
	290A	Bladder	6.76	8.91	11.5	4"	5.26	-4.74	10	13.65	8.6	Micro Purge
Bayside Monitoring	387AT	Bladder	14.91	17.65	15.0	4"	8.81	-0.09	8.9	17.74	16.5	Micro Purge
	388AT	Bladder	14.92	17.91	23.0	4"	8.92	-4.48	13.4	25.99	17.5	Micro Purge
	390AT	Bladder	38.77	38.14	38.0	4"	11.27	0.77	10.5	37.37	34.8	Micro Purge
	391AT	Bladder	31.81	34.07	20.0	4"	23.41	13.41	10	22.26	16.5	Micro Purge or Passive Purge
	351CT	Bladder	50.14	49.93	30.5	4"	24.64	19.64	5	30.29	26.0	Micro Purge or Passive Purge
	345AT	Bladder	48.91	48.41	20.0	5"	38.91	28.91	10	19.50	18.0	Micro Purge or Passive Purge
	340AT	Bladder	14.25	13.59	14.0	4"	10.25	0.25	10	13.34	12.0	Micro Purge
	337F	Bladder	68.43	71.07	52.0	4"	41.43	16.43	25	54.64	41.5	Micro Purge

Notes:

GS - Ground Surface

TOC - Top of Casing

Table 1 is subject to change as field conditions warrant.

Placement of pumps is based on geology, hydrology (amount of water below or above intake) and screen interval

Table 2
Sample Preservation and Containers
Chevron Richmond Refinery

Analytical Parameter	Analytical Method[1]	Preservation and Storage	Holding Time	Sample Size	Containers	
					Type	Quantity
Benzene and Methyl Tert Butyl Ether	EPA SW8021B	HCL to pH <2, 4°C	14 days (7 days unpreserved)	40 mL	VOA vials with Teflon-lined septum cap	3
Volatile Organic Compounds	EPA SW8260B	HCL to pH <2, 4°C	14 days (7 days unpreserved)	40 mL	VOA vials with Teflon-lined septum cap	3
Total Petroleum Hydrocarbons as Gasoline Range Organics (TPH-GRO)	EPA SW8015B	HCL to pH <2, 4°C	14 days (7 days unpreserved)	40 mL	VOA vials with Teflon-lined septum cap	3
Total Petroleum Hydrocarbons as Diesel Range Organics (TPH-DRO)	EPA SW8015B	4°C	14 days for extraction; 40 days for analysis	1 Liter	Amber glass with Teflon-lined cap	1
Total Petroleum Hydrocarbons as Diesel Range Organics with Silica Gel Cleanup (TPH-DRO w/ Si Gel)	EPA SW8015B	4°C	14 days for extraction; 40 days for analysis	1 Liter	Amber glass with Teflon-lined cap	1
Semivolatile Organic Compounds	EPA SW8270C	4°C	7 days for extraction; 40 days for analysis	250 mL	Amber glass with Teflon-lined cap	2
Polynuclear Aromatic Hydrocarbons	EPA SW8270C or EPA SW8270C SIM	4°C	7 days for extraction; 40 days for analysis	1 Liter	Amber glass with Teflon-lined cap	2
Organochlorine Pesticides	EPA SW8081A	4°C	7 days for extraction; 40 days for analysis	1 Liter	Amber glass with Teflon-lined cap	2
Dissolved metals (Arsenic, Cadmium, Lead, Nickel, Selenium, Zinc, Landfarms list of metals, Appendix IX metals)	EPA SW6010B, EPA SW6020	0.45µm filter, HNO_3 to pH <2, 4°C	6 months	500 mL[2]	Polyethylene bottle	1
Mercury, dissolved	EPA SW7470A	0.45µm filter, HNO_3 to pH <2, 4°C	28 days	500 mL[2]	Polyethylene bottle	1
Chromium VI	SM19 3500-Cr B	0.45um filter, 4°C	24 hours	250 mL	Polyethylene bottle	1

Table 2
Sample Preservation and Containers
Chevron Richmond Refinery

Analytical Parameter	Analytical Method[1]	Preservation and Storage	Holding Time	Sample Size	Containers	
					Type	Quantity
Sulfide, dissolved	EPA 376.2	AlCl3 + NaOH to pH>9, no headspace at time of collection; Decanted & preserved with ZnAc before shipment, 4°C	7 days	500 mL	Polyethylene bottle	1
Fluoride	SM20 4500-F C	4°C	28 days	500 mL	Polyethylene bottle	1
Unionized Ammonia as Nitrogen	SM 8010F	H2SO4 to pH<2, 4°C	28 days	1 Liter	Clear glass with Teflon-lined cap	1

Abbreviations:
< - Less than
°C – Degrees Celcius
EPA – United States Environmental Protection Agency
µm - Micrometer
mL – Milliliter
HCl - Hydrochloric acid
HNO3 – Nitric acid
SIM - Selected ion monitoring
SM – Standard Method
SVOCs - Semivolatile organic compounds
H2SO4 – Sulfuric acid
VOA – Volatile organic analysis
ZnAc - Zinc acetate

Notes:
[1]- SW-846 Test Methods for Evaluating Solid Waste, EPA, Third Edition last update IV February 2007, and Standard Methods for the Examination of Water and Wastewater 18th, 19th & 20th Edition
2- Only one bottle needs to be collected for laboratory analysis of all metals.

Field Forms

CHAIN-OF-CUSTODY RECORD
SAMPLE ANALYSIS REQUEST

Chevron Environmental Management Co.
940 Hensley Street
Richmond, CA 94801

North Yard Sector RGMP (178A, 675A, 550A, 377C, 178C, 671A)
RGMP 1st Semester 2013

Contact: Alex Boyd
Phone: (510) 242-9717

Sample Collector's Name: Kevin Ashley

Special Handling/Storage: Cool to 4 degrees C

Sample ID	Container Qty.	Date/Time Sampled	Geotracker Field Point Name	Sample Information

Please analyze for these listed analytes:

Note to Lab: 5 day TAT for VOC's

EPA 8021B (3 - 40 mL VOA)

Benzene; MTBE

EPA 8015B (3 - 40 mL VOA)

Total Volatile Hydrocarbon - Gasoline

EPA 8015B (2 - 1 Liter Amber Glass Bottles)

TPH-Diesel; and TPH-Diesel w/10g Silica Gel

EPA 6020 (1 - 250 mL Polyethylene Bottle, Field Filtered and preserved w/ HNO3)

Nickel; Lead

Volatiles Preserved: **N/A** **No** **Yes**

Metals Filtered: **N/A** **No** **Yes** HNO_3 < 2.0 pH

1. _____ **Sampler** _____
Signature Title Name Inclusive Dates and Time

2. _____ _____
Signature Title Name Inclusive Dates and Time

3. _____ _____
Signature Title Name Inclusive Dates and Time

4. _____ _____
Signature Title Name Inclusive Dates and Time

CC: NWENV-RRROMOOO9403

Groundwater Purging and Sampling Form

Project Name: _____ **Well No.** _____

Sector/ Area: _____ Well Type: ☐ Monitor: Flush mount or Stove pipe

Purged By: **Sampled by:** ☐ Other: **Date:**

WELL PURGING (Please Complete all Appropriate Fields and Check all Boxes)

Well casing diameter

☐ 2-inch ☐ 3-inch ☐ 4-inch ☐ 5-inch Other: _____

Well Total Depth (TD, ft. below TOC): _____

Depth to Water (WL, ft. below TOC): _____

Previous DTW (WL, ft. below TOC): _____ Air temp: Wind:

Depth to FPLH if present (ft. below TOC): _____

(FPLH - Free phase liquid hydrocarbon) **Wellhead vapor:** **ppm**

Meter Type:

PURGE METHOD (Please Check)

☐ Conventional: **Pump type and tubing (Please Circle):**

☐ Micro purge: **QED Bladder Pump or Other:** _____

☐ Passive: **Pump type:** Long (390 mL) or Short (130mL)

Tubing diameter : 1/4" (5.3mL/ft) or 3/8" (9.5mL/ft)

Depth to Pump Intake: _____

Depth to Top of Screen: _____

Depth to Bottom of Screen: _____

(Depths are from TOC)

PURGE VOLUME CALCULATION (FOR CONVENTIONAL PURGE ONLY)

Volume (V)= Total Depth (TD) - Water level (WL) x Multiplier (casing diameter x gal/per linear foot)

_____ x _____ = _____ x _____ = _____

Water Column Length (ft) Multiplier* (1 well volume) (Number of Volumes)

*Multiplier for each casing diameter (calculated in gallons/foot): ***2"*** = 0.16, ***3"*** = 0.37, **4**"= 0.65, **5**"= 1.02

Total Purge Time: _____ (minutes)

Recharge Rate: _____ (feet per minute) ACTUAL PURGE VOL: _____

System Volume (for micropurge and passive purge)

_____ X _____ + _____ = _____

Pump intake (ft below TOC) x 5.3 (1/4") or 9.5 (3/8") + pump type = **System volume**

Purge Rate: _____ **(ml/min)** **Air pressure:** _____**(PSI)**

GROUNDWATER PARAMETER MEASUREMENTS

Field Meter Type: QED MP20DT or QED MP20 w/HACH Turb. , or other _____ (Please Circle)

Purge Start time: D	R	Time/Volume (mL)	Water Level (ft)	Temperature (°C)	Conductivity (mmhos)	Dissolved Oxygen (mg/L)	pH (ATC)	Turbidity (NTU)	ORP (mV)	Water Color/Odor/CPM/Air Pressure/Remarks
		/								
		/								
		/								
		/								
		/								
		/								
		/								
		/								
		/								
		/								

Previous D/R and Air pressure:_____**QED Info: D= Discharge rate/R= Refill rate (measured in seconds). Comments during purge, well condition:**

Purge water disposal: Onsite Other: _____

WELL SAMPLING

Sample Collection Method: Dedicated system ☐ Disposable Bailer ☐ Other:

Sample ID: **Samplers Initials:** **Final Water Level:**

Sample Date: **Sample Time:** Samples Preserved (< pH 2)? : Metals: VOA's: Phenolics: Diss.Sulfide:

Temp. Blank ID: **Temp. at Start of Day:** **Temp. at End of Day:**

Quality Control Samples	Date and Time	Total containers: (well sample)
Trip Blank ID:		Total containers: (QC samples)
Field Duplicate:		Signed:
Matrix Spike:		
Matrix Spike Duplicate:		**Extra pages:** Yes No

GROUNDWATER WELL EQUIPMENT CALIBRATION LOG

Personnel: _____ **Company** _____

pH Calibration EQUIPMENT DESCRIPTION	Calibration Date/Time	pH-4 Result	pH-7 Result	Standard Expiration Date	Standard Expiration Date	Source of buffer	PH -4 Lot Number	PH-7 Lot Number	Comments
QED MP20 / QED MP20T	/								
QED MP20 / QED MP20T	/								
QED MP20 / QED MP20T	/								
QED MP20 / QED MP20T	/								
	/								

Specific Conductance EQUIPMENT DESCRIPTION	Calibration Date/Time	500 mS/cm	5,000 mS/cm	Standard Expiration Date	Standard Expiration Date	Source of standard	500 m S/cm Lot Number	5,000 m S/cm Lot Number	Comments
QED MP20 / QED MP20T	/								
QED MP20 / QED MP20T	/								
QED MP20 / QED MP20T	/								
QED MP20 / QED MP20T	/								
	/								

Dissolved Oxygen EQUIPMENT DESCRIPTION	Calibration Date/Time	Barometric Pressure 760 mmHg	DO% 100 Saturation	Source of Standard				Comments
QED MP20 / QED MP20T	/							
QED MP20 / QED MP20T	/							
QED MP20 / QED MP20T	/							
QED MP20 / QED MP20T	/							
	/							

Turbidity EQUIPMENT DESCRIPTION	Calibration Date/Time	_____ NTU Standard	_____ NTU Standard	_____ NTU Standard	Standard Expiration Date	Source of Standard	Lot Number	Comments
Hach 2100P / QED MP20T	/							
Hach 2100P / QED MP20T	/							
Hach 2100P / QED MP20T	/							
Hach 2100P / QED MP20T	/							
	/							

ORP EQUIPMENT DESCRIPTION	Calibration Date/Time	Temp in C	Ag/AgCl in mV (cal. value)	Standard Expiration Date	Source of Standard	Lot Number		Comments
QED MP20 / QED MP20T	/							
QED MP20 / QED MP20T	/							
QED MP20 / QED MP20T	/							
QED MP20 / QED MP20T	/							
	/							

Chevron
Environmental Management Company
Richmond Refinery North Yard
940 Hensley St., Richmond, CA 94801

Sample ID: 032513550AFS Date: 3/25/2013
Source: Groundwater Time: 1333
Collected By: KA

METHODS / ANALYSIS

SM 3500D Hexavalent chromium

250 ml amber

Metals Field Filtered? YES NO
Preservative: NONE, HNO_3, H_2SO4, HCL, NaOH, H_3PO_4
$CuSO_4$, CH_3COO_2, $Na_2s_2O_3$, $AlCl_3$

Chevron
Environmental Management Company
Richmond Refinery North Yard
940 Hensley St., Richmond, CA 94801

Sample ID: 032513550AFS Date: 0325/13
Source: Groundwater Time: 1333
Collected By: KA

METHODS / ANALYSIS

EPA 8021B Benzene
EPA 8021B MTBE
EPA 8015B Total Volatile Hydrocarbon- Gasoline

40 ml VOA

Metals Field Filtered? YES NO
Preservative: NONE, HNO_3, H_2SO4, HCL, NaOH, H_3PO_4
$CuSO_4$, CH_3COO_2, $Na_2s_2O_3$, $AlCl_3$

Chevron
Environmental Management Company
Richmond Refinery North Yard
940 Hensley St., Richmond, CA 94801

Sample ID: 032513550AFS Date: 3/25/2013
Source: Groundwater Time: 1333
Collected By: KA

METHODS / ANALYSIS

EPA 8021B Benzene
EPA 8021B MTBE
EPA 8015B Total Volatile Hydrocarbon- Gasoline

40 ml VOA

Metals Field Filtered? YES NO
Preservative: NONE, HNO_3, H_2SO4, HCL, NaOH, H_3PO_4
$CuSO_4$, CH_3COO_2, $Na_2s_2O_3$, $AlCl_3$

Chevron
Environmental Management Company
Richmond Refinery North Yard
940 Hensley St., Richmond, CA 94801

Sample ID: 032513550AFS Date: 3/25/2013
Source: Groundwater Time: 1333
Collected By: KA

METHODS / ANALYSIS

EPA 8021B Benzene
EPA 8021B MTBE
EPA 8015B Total Volatile Hydrocarbon- Gasoline

40 ml VOA

Metals Field Filtered? YES NO
Preservative: NONE, HNO_3, H_2SO4, HCL, NaOH, H_3PO_4
$CuSO_4$, CH_3COO_2, $Na_2s_2O_3$, $AlCl_3$

Chevron
Environmental Management Company
Richmond Refinery North Yard
940 Hensley St., Richmond, CA 94801

Sample ID: 032513550AFS Date: 3/25/2013
Source: Groundwater Time: 1333
Collected By: KA

METHODS / ANALYSIS

EPA 8015B TPH Diesel w/ 10g Silica Gel
TPH Diesel

1 Liter AG

Metals Field Filtered? YES NO
Preservative: NONE, HNO_3, H_2SO4, HCL, NaOH, H_3PO_4
$CuSO_4$, CH_3COO_2, $Na_2s_2O_3$, $AlCl_3$

Chevron
Environmental Management Company
Richmond Refinery North Yard
940 Hensley St., Richmond, CA 94801

Sample ID: 032513550AFS Date: 3/25/2013
Source: Groundwater Time: 1333
Collected By: KA

METHODS / ANALYSIS

EPA 8015B TPH Diesel w/ 10g Silica Gel
TPH Diesel

1 Liter AG

Metals Field Filtered? YES NO
Preservative: NONE, HNO_3, H_2SO4, HCL, NaOH, H_3PO_4
$CuSO_4$, CH_3COO_2, $Na_2s_2O_3$, $AlCl_3$

Appendix N
Monitoring Well Inspection and Maintenance Program Plan, Richmond Refinery
(March 23, 2015)

MONITORING WELL INSPECTION AND MAINTENANCE PROGRAM PLAN RICHMOND REFINERY

March 23, 2015

***Prepared for*:**

Chevron Environmental Management Company
940 Hensley Street
Richmond, California 94801

***Prepared by*:**

Leidos Engineering, LLC
1000 Broadway, Suite 675
Oakland, California 94607

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TABLE

Table 1 Monitoring Well Construction Information

APPENDICES

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Appendix B Well Maintenance and Abandonment Request Forms
Appendix C Generalized Monitoring Well Construction Components

ACRONYMS

CY	Calendar Year
MP	Measurement Point
MWIMP	Monitoring Well Inspection and Maintenance Program
PVC	Polyvinyl Chloride
SS	Stainless Steel
TOC	Top of Well Casing
WMR	Well Maintenance Request
WW	Well Wizard® Bladder Pump – Dedicated

MONITORING WELL INSPECTION AND MAINTENANCE PROGRAM PLAN
RICHMOND REFINERY

1.0 INTRODUCTION

This Monitoring Well Inspection and Maintenance Program (MWIMP) Plan has been prepared to ensure the continued integrity of groundwater monitoring wells installed at the Chevron U.S.A. Richmond Refinery in Richmond, California (Figure 1). This plan describes the systematic approach for:

- Inspecting the physical condition of monitoring wells,
- Determining maintenance needs that extend the life of a well and help ensure the accuracy of data collected from those wells,
- Assigning responsibilities for ensuring maintenance needs are completed in a timely manner,
- Identifying those wells that no longer meet acceptable monitoring well design or well construction standards and require abandonment, and
- Documenting any repairs or modification made to the wells.

Effective stewardship, and a program of routine scheduled inspections of the physical condition of each monitoring well, ensures that representative water-quality samples and hydrologic data are obtained from the well network and helps control the infiltration of surface water and protection of groundwater quality.

2.0 BACKGROUND

Groundwater monitoring is performed at the Richmond Refinery in accordance with the following Regional Water Quality Control Board (RWQCB) regulatory orders and Department of Toxic Substances Control (DTSC) permits:

- RWQCB Order R2-2011-0036,
- RQWCB Order R2-2012-0015, and
- DTSC Hazardous Waste Facility Post-Closure Permit Landfarms 1-5.

Currently, the groundwater monitoring program is overseen by Leidos Engineering, LLC (Leidos), on behalf of Chevron Environmental Management Company.

To meet the monitoring program requirements under these regulatory agency agreements, it is an expectation by the regulatory agencies that the monitoring wells are maintained to ensure groundwater data integrity and to protect groundwater quality.

This MWIMP Plan documents the well inspection schedule and procedures, the processes for identification of maintenance needs, assignment of responsibilities for overseeing the well maintenance activities, and the criteria to follow to develop a schedule for implementation of the maintenance activities.

3.0 TECHNICAL APPROACH

The technical approach of this plan involves:

- Determining the status designation of the well (e.g., determines the inspection frequency),
- Establishing a program of routine well inspections to assess the physical condition of each well,
- Identifying maintenance needs from the well inspections,
- Prioritizing maintenance work based on well status, well component requiring maintenance, and available resources,
- Documenting and verifying all maintenance work that is performed, and
- Identifying wells that no longer meet groundwater monitoring program objectives for integrity, or are damaged beyond repair, and must be decommissioned.

A step-by-step flow diagram included as Figure 2 illustrates the MWIMP process.

The objectives of this plan are to:

- Establish the MWIMP,
- Describe the role and duties of the MWIMP coordinator,
- Describe the well status designations,
- Identify and describe the well components (inspection items),
- Define the minimum acceptable standards for the condition of each well component,
- Establish a maintenance program to correct or repair well components that do not meet these standards,
- Describe how well inspection and maintenance activities are prioritized, managed, and documented.

3.1 WELL STATUS DESIGNATION

The status designation (active or inactive) of a monitoring well determines the frequency of well inspection, the scope of the inspection, and the prioritization of maintenance. The criteria for determining a well's status designation are briefly summarized below. Active status is granted to:

- Wells sampled to address groundwater monitoring requirements specified in regulatory orders and permits, or
- Wells used to monitor groundwater surface elevations.

Changes to the status designation of a well are coordinated between the MWIMP coordinator and the manager of the refinery groundwater monitoring program. Active status will also be granted to any newly installed well. The status of the well may change if the well no longer meets any of the above criteria, the well has been damaged beyond repair, or at the discretion of the MWIMP

coordinator. Any change in the status of a well will be communicated to and discussed with regulatory agencies.

Inactive status is granted to wells where:

- The well is not included in an active regulatory groundwater sampling program,
- The well is not used to monitor groundwater surface elevations,
- The well components do not appear to meet the minimum construction standards,
- Historical monitoring data are not available, or
- The well provides redundant monitoring coverage with other wells.

A well is removed from the active or inactive list if the well is damaged beyond repair and a request for well abandonment has been made.

There are two well inspection schedules for monitoring wells listed in the plan: Annual and Biennial. Active wells are inspected annually ("Annual Inspection Checklist", Appendix A) for both primary (P) and secondary (S) inspection items (see discussion in sections 3.2 and 3.3). Both the active and inactive wells are inspected on a biennial basis ("Biennial Inspection Checklist", Appendix A), and down-hole conditions are assessed at that time by measuring total well depth.

Maintenance on active wells is prioritized based on resources and need. Emphasis is placed on maintaining primary inspection items on all wells. Inactive wells are inspected for primary and secondary inspections items, but only primary inspection items are given priority (section 3.2).

3.2 WELL INSPECTION AND MAINTENANCE PROGRAM

For each annual or biennial inspection event, the MWIMP coordinator compiles a list of all monitoring wells, and includes or excludes wells added or removed from the program.

The MWIMP coordinator continues to compile the list of wells and will:

1. Remove any wells that are slated for abandonment,
2. Temporarily remove any wells that have unsafe access problems due to construction or other similar conditions,
3. Compile well-specific construction information, and
4. Communicate special instructions for known and/or posted well access requirements to field personnel performing the well inspections.

The MWIMP coordinator groups the wells by geographic location, and then provides field personnel with work packages assigned by sector. Each work package contains the list of wells to be inspected, the length of the monitoring well (from top of casing to bottom, to an accuracy of 0.01 foot; see discussion in section 3.3.4), any special instructions, and copies of well location maps. The program requirement is for all well inspections to be filed electronically, even if paper checklists are used in the field. Copies of the well inspection checklists are provided in Appendix A.

The MWIMP coordinator is responsible for assuring that all field personnel are trained, qualified and have been briefed on the hazards and controls associated with the task to be performed.

Field personnel are required to review and sign the applicable Job Hazard Analysis prior to starting any work.

Prior to performing well inspections, field personnel review work packages, all field information, and special instructions. Personnel gather appropriate equipment (weighted tape measures, safety equipment, and decontamination supplies), obtain a vehicle, and make arrangements for access as necessary (acquire guest badges, make calls to Plant Protection to open gates, or similar steps to be able to access the well locations).

When performing well inspections, field personnel verify the physical condition of each well location, complete primary and secondary inspection items on the checklist (see section 3.3), perform and record a total well depth measurement (during biennial inspections), note whether dedicated monitoring equipment is present, note if the depth measurement was soft or hard, and note any other problems or anomalies. If the well inspection checklists are recorded on paper, the personnel performing the paper inspections are responsible for providing their field records to the MWIMP coordinator who will transfer this information to the appropriate electronic checklist. The MWIMP coordinator, or designee, is then required to verify each checklist before it becomes a final record and filed electronically. Field personnel report any abnormalities observed in the field and any items that require immediate attention to the MWIMP coordinator.

The MWIMP coordinator maintains a spreadsheet of individual inspection items that require maintenance. Maintenance items are prioritized according to well status, primary (P) or secondary (S) inspection items, and available resources. A Well Maintenance Request (WMR; see Appendix B) is initiated indicating the type of maintenance requested (P or S) and a detailed description of the maintenance work needed. The WMR is the official record of maintenance activities, documenting the work requested, actual work performed, and noted exceptions. Each WMR is assigned a unique identifier consisting of an eight-digit date (mmddyyyy) followed by the well number and a P or an S (depending on whether the maintenance need is to a primary or secondary inspection item).

Based on the nature of the maintenance, the WMR may be issued to a contractor to perform the maintenance work. The contractor may perform a sitewalk to inspect the requested work and provide input prior to preparing and submitting a cost estimate on the scope of work. The maintenance work is performed by the contractor in accordance with the scope of work outlined in the WMR, this plan (see section 3.3), or another specified statement of work. All maintenance work is inspected for completeness and any problems, comments, or deviations from the agreed on scope of work is documented on the WMR.

If the condition of a primary inspection item is beyond practical repair or if the well is damaged beyond repair, the MWIMP coordinator initiates an abandonment request (Appendix B) and submits it to the Leidos Richmond Program Manager and Chevron EMC for approval. The abandonment request documents: 1) the reason for abandonment, 2) the name of the individual whom submits the request, 3) includes photo documentation or other data supporting the request, and 4) includes a copy of the original well log. Once approval of the abandonment request is received, the MWIMP coordinator will submit the log to a licensed well driller for a cost quote. Once Chevron's approval of the abandonment has been received, the MWIMP coordinator will work with the driller to: 1) prepare a drilling permit package to Contra Costa County Environmental Health Division, 2) schedule the drill crew and staff, and 3) schedule the county inspector.

On completion of the well abandonment, the MWIMP coordinator will complete all abandonment documentation (logs, Department of Water Resources forms, etc.). Each abandonment request is given a unique identifier consisting of an eight-digit date (mmddyyyy) followed by the well number and ABND (for abandoned). The well is removed from the active or inactive well list once abandonment has been completed. The status of the well is changed to "abandoned", and the date of the abandonment is entered. The driller signs the required County and State well forms and submits signed copies to the MWIMP coordinator.

Well inspection checklists, along with completed WMRs, abandonment requests, copies of permits and any County or State forms prepared as part of the well maintenance or abandonment are compiled and placed in an electronic Chevron directory.

3.3 WELL INSPECTION ITEMS (WELL COMPONENTS)

Active and inactive wells under this Program are inspected for both primary and secondary inspection items, each relating to a specific well component. Primary (P) inspection items are those well components that ensure representative subsurface conditions for sampling and hydrologic monitoring purposes. These components include the condition of the well casing, well security, well identification, and the down-hole condition of the screened or open interval. Primary inspection items also include features that control the entry of surface water into the casing or permeable sandpack, such as condition of the sanitary seal and expanding well plugs. Because the primary inspection items are crucial to the well's integrity and its ability to provide representative data, these inspection items are given a higher priority for maintenance. Secondary (S) inspection items are those components of a monitoring well that if damaged or compromised will not generally affect the collection of representative groundwater analytical samples or hydrologic information. These items include paint condition, faded well labels, and presence of rust on steel protective casing. For active wells, secondary inspection items will be maintained, but for inactive wells (unless there is a safety concern) maintenance of secondary items are performed on an as-needed basis. Generalized schematic diagrams of monitoring well components are found in Appendix C. As the existing monitoring wells were installed over a period of many years, beginning in 1980, there is variation on the configuration of well components.

3.3.1 Well Casing (P)

Well casing diameter, material type, and construction have varied over the years, and was often dependent on the availability of materials, project requirements, the drilling subcontractor, expected subsurface conditions, the well's depth, and the original purpose of the installation. In general, two types of monitoring wells are installed at the refinery: wells completed with screened intervals in the first encountered water-bearing zone (A, AF, and F zones) and wells completed with screened intervals in deeper zones (C, B, and D zones).

Wells screened in deeper water-bearing zones typically include a conductor casing that is initially installed across the shallow water-bearing zone to prevent cross contamination of groundwater. The conductor casing is installed by drilling a borehole using larger-diameter augers, cementing the outer casing in place, and then drilling within the cemented conductor casing to the planned completion depth.

Monitoring wells are typically constructed of either stainless steel (SS) or polyvinyl chloride (PVC) material. The screened portion of the casing, which is situated within the saturated zone,

can be composed of fine slots, commonly 0.010- or 0.020-inch in size. During construction of the well, a permeable filter pack consisting of a well-sorted sand is placed across the perforated casing interval, with a foot or so additional filter pack above the top of the slotted casing, at least one foot of a bentonite clay placed on top of the sandpack, and a Portland cement grout placed from the bentonite seal up to the ground surface. A generalized schematic of monitoring well components is included in Appendix C.

Wells completed with casing extending above the ground surface require an outer protective casing, which encases the inner riser casing stick-up (Appendix C). The outer protective surface casing provides well security.

Riser casings and outer protective surface casings are inspected for signs of physical deterioration or damage, such as cracks, corrosion, breaks, dents, and bends that can affect the structural integrity of the well. Any well casing that has sustained damage should be noted on the well inspection checklist. Also, any exposed portion of the annular grout seal should be inspected for signs of deterioration (e.g., loose casing) or for cracks and breaks due to degradation or from wells that have experienced damage. For wells where it is possible for water to collect between the outer protective surface casing and the well casing itself, a weep-hole must be installed in the outer protective casing to allow the water to drain.

Wells with a flush-mount design are typically employed in areas of vehicle traffic. The riser casing is cut off below the ground surface, and the uppermost portion of the well casing is housed below grade inside a christy box, manhole enclosure, or vault, with a traffic-rated cover that bolts securely to the flush-mount box. In addition to standard inspection items, flush-mounted wells will be inspected for the following:

1. The presence of an intact concrete apron (pad) around the manhole enclosure and whether the enclosure is installed slightly elevated above grade with the concrete apron sloping away from the well;
2. The presence of a gasket seal for the traffic cover, and its condition (does not allow water to enter the manhole enclosure);
3. Whether the traffic cover is securely bolted to the manhole enclosure;
4. Whether water collects inside the manhole enclosure; and
5. The presence of a water-tight locking cap, the condition of the cap, and whether it makes a water-tight seal with the casing.

Casing maintenance may involve replacing or extending the outer protective casing (or riser casing) portion that is above ground; adding outer protective casing around the riser casing; replacing/repairing the christy box/manhole enclosure/vault for flush-mounted wells; adding grout in the annular space between the well casing and the outer protective casing; and repairing the annular grout near the ground surface (if the casing is loose). In some areas where the outer protective steel casing comes in contact with brackish surface water and rusting is accelerated, rust-resistant outer protective casing materials may be used in place of steel.

3.3.2 Well Security (P)

To prevent unauthorized access, all monitoring wells are secured with refinery-provided locks. The type of well cap and locking configuration is based on the type and diameter of the outer protective casing, and whether a dedicated bladder pump (Well Wizard® [WW]) is installed in

the well. This design is typical of all wells with steel protective casing (usually 6 to 10 inch in diameter). For flush mounted wells, a lockable water-tight cap is required, independent of casing type or diameter.

Wells installed with dedicated WW sample pumps have a different well cap and locking configuration than those listed above. The WW cap contains the connection fittings to operate the bladder pump, suspended by tubing below the cap.

Locks are inspected for corrosion and operation of the locking mechanism. Hasps are visually inspected for corrosion, damage, and the overall condition of the welds. Hasps or hinges found to be substantially corroded will be replaced. Locks that are corroded or difficult to operate will be replaced; lubricants should not be used to improve performance of the lock mechanism if there is a potential for these substances to impact water quality samples collected from the well. If a well shows evidence of tampering (i.e., bolt-cut locks or broken hasps), the inspection personnel will notify the MWIMP coordinator for further action. Well caps are inspected for snugness to the casing, and should not be removable without removing the lock first. Inspect all WW caps and extension pieces for damage, cracks, or looseness. Wells with missing caps and locks should be reported to the MWIMP coordinator.

3.3.3 Well Identification (P)

Correct well identification is important for tracking all subsequent sampling and monitoring data obtained from the well. All monitoring wells must be accurately identified, whether with a well tag—a stainless steel or aluminum plate, engraved, stamped, or etched with the well identification number—or a painted designation. The well identification tag is attached to the riser casing. For flush-mount wells, the well identification may be painted on the concrete apron or on the casing within the vault. Well identification should not be placed only on lids or caps that can be removed and used at other locations.

The well identification tag or painted designation should be inspected to ensure that the well number is legible and correct. If the tag or painted marking are faded or illegible, the MWIMP coordinator will be notified and the tag replaced or designation repainted.

3.3.4 Down-Hole Condition of the Screened Interval (P)

The down-hole condition of the screened interval can only be evaluated directly through the use of a down-hole video camera or the analysis of well performance information (e.g. hydraulic conductivity, pumping rates, specific yield, pumping duration), which is beyond the scope of this plan. For example, well screen deterioration caused by chemical or biological incrustation can result in substantial reduction in well yield (Driscoll, 1986). Depth measurement is the standard direct method of measuring any change in the down-hole physical condition of a well. By comparing these measurements to a reference depth (see discussion below) it can be determined if changes are occurring in the condition of the monitoring interval due to differences in the measured and reference depths. Significant differences (>20 percent of the screened interval) between the measured depth and the reference depth may indicate:

- Field measurement errors (e.g., wrong well, recording errors, or incorrect measurement reference point used); errors in the weighted tape used to measure the depth (e.g., stretching, cannot read tape increment); or measuring point (MP) changes due to casing length changes (e.g., construction, damage);

- Incorrect initial MP reference lengths or elevations;
- Accumulation of sediment or other debris in the bottom of the well; or
- Obstructions in the well which would provide an inaccurate depth measurement, and could possibly be caused by: 1) structural failure of the well casing or screen, 2) instrumentation stuck in the well, or 3) snagging of measurement device due to down-hole orientation of casing or screen joints and the degree of vertical deviation of the well.

Many wells exhibit accumulations of sediment, which may eventually fill/plug the screened interval if it is not removed by re-development. This sediment can affect the performance of the well and the quality of analytical samples obtained from the well. The accumulation of sediment in the bottom of a well accounts for the differences between the reference depth (see discussion below) and the measured depth.

All depth measurements are taken from a reference mark, designated surveyed top of casing (TOC) measurement point, located at the top of the innermost casing, recorded as feet below TOC. These are recorded to the nearest hundredth of a foot. The level of unacceptable sediment accumulation in the well is calculated by subtracting the measured depth from the reference depth and dividing by the length of the screened interval. If the result of the calculation is 0.2 or greater, the interval is considered to be approximately 20 percent filled, and a WMR is initiated requesting the well be rehabilitated (re-developed) and the sediment removed.

In this MWIMP Plan, the constructed depth is used as the reference depth ("well depth" measured from ground surface on Table 1). The constructed depth is a calculated value based on well construction details provided in the historical well logs or earlier Standard Operating Procedures (SOP) manual (URS, 2002). Because there have been unexplained differences between the original well construction data and what is observed in the field, problems arise when using these constructed depth values in the calculation to determine the amount of sediment accumulation in a well. Discrepancies included: the measured depth being several feet deeper, or shallower, than the constructed depth, but no other indication of sediment accumulation, obstruction, and/or equipment in the well, or any other structural failure in the well.

The MWIMP coordinator provides additional well specific information to field personnel (section 3.2) for wells that have obstructions or dedicated pumps in the well. For all 2-inch wells, dedicated sampling equipment will need to be removed prior to performing a depth measurement. During pump removal, groundwater from the sampling equipment will need to be contained. Field personnel are required to note any other abnormalities, different than the information provided, or note any other reason that the measured depth differs significantly from the well depth. Field personnel are also required to indicate whether a depth measurement was hard or soft (an indicator of possible sediment buildup at the bottom of the well).

Where the measured and reference tag depths differ substantially (greater than 10 percent of well length), the MWIMP coordinator must determine if:

- A field measurement error occurred,
- The measurement did not pass an obstruction or dedicated instrumentation,
- Reference well depths or elevations were incorrect,

- A new obstruction has occurred,
- Sedimentation has occurred, or
- A structural failure has occurred.

3.3.5 Well Access (S)

Most well sites inside the fenced portion of the Richmond Refinery are easily accessible. Well access roads comprised of asphalt pavement or gravel are common. Some wells are accessible only by walking on either improved or unimproved trails. Outside of the refinery boundary, such as in tidal wetlands, some wells may only be accessible during periods of low tide by walking on marsh vegetation.

Well access should be inspected to identify conditions that require maintenance (overgrown brush, erosion of the road surface) or preclude access to the wells (e.g., construction activities, closed roads). Access restrictions and requirements not already identified by the MWIMP coordinator (section 3.2) should be noted on the inspection checklist. Maintenance may involve mowing, brush removal, weed-eating, and removal of obstacles blocking the access road (e.g., construction materials, parked equipment). Repairing and re-grading road surfaces will be done on an as-needed basis and dependent on well status, available resources, and future development plans for the area.

3.3.6 Concrete Pad (S)

Concrete pads are used to prevent infiltration of surface water (and subsequently surface contamination) through the annular space between the borehole and the casing. A square or circular surface pad of concrete is emplaced (Appendix C) around the outermost casing. Concrete pads are present for most active monitoring wells. The installation or repair of concrete pads at the wells will be evaluated on a case-by-case basis.

The top of the concrete pad should be a minimum of 1 to 3 inches above ground level and sloped away from the well to prevent water from ponding around the well casing or protective surface casing. Inspection of the concrete pad will include identifying any damage (cracks, breaks, deterioration), and determining whether the top of the concrete pad is properly sloped. Maintenance may include patching cracks, patching damaged or deteriorated areas of the pad, replacing the pad, stabilizing the existing pad, or placing additional concrete to ensure that the pad is properly sloped.

3.3.7 Protective Posts (S)

Protective posts, guard posts, or bollards are required for all active monitoring wells, to protect the exposed riser casing stick-up (portion above ground surface) from collision damage (e.g., mowing equipment, vehicular traffic, heavy equipment). Up to four posts are installed around each monitoring well, with a minimum of 3 feet of the post below the ground surface (Appendix C). Posts are generally located at the corners of the concrete pad, and painted high-traffic yellow (for visibility), or provided with an appropriately colored durable plastic sleeve. Placement of the posts should protect the well from all potential traffic approaches (normally 4 feet to 5 feet apart). The height of the posts (a minimum of 3 feet above ground surface) should protect the well from collision damage and allow work-over rigs and sampling vehicles access to the well. The posts should be inspected for physical damage or deterioration, paint degradation, and proper positioning. Maintenance will generally involve repainting or the installation of plastic

bollard sleeves, but damaged posts should be replaced and additional posts may be installed if conditions warrant.

3.4 RECORD-KEEPING AND REPORTING

The records generated by the MWIMP include:

- Well inspection checklists (annual and biennial),
- Well maintenance requests (generated as needed with backup documentation), and
- Abandonment requests (generated as needed).

These records will be compiled by the MWIMP coordinator and stored electronically in a Chevron online directory. A copy of this Plan will also be stored in the same electronic directory. This Plan will be reviewed biennially and may be updated as necessary. The status designation of wells (active and inactive), is not static and any changes to this status will be documented in addenda to the Plan.

4.0 REFERENCES

Driscoll, F.G. 1986. *Groundwater and Wells*. Second Edition. Johnson Division, St. Paul, Minnesota.

URS, 2002. *Groundwater Monitoring Program Standard Operating Procedures, Chevron Products Company, Richmond, California.* August 13.

Figures

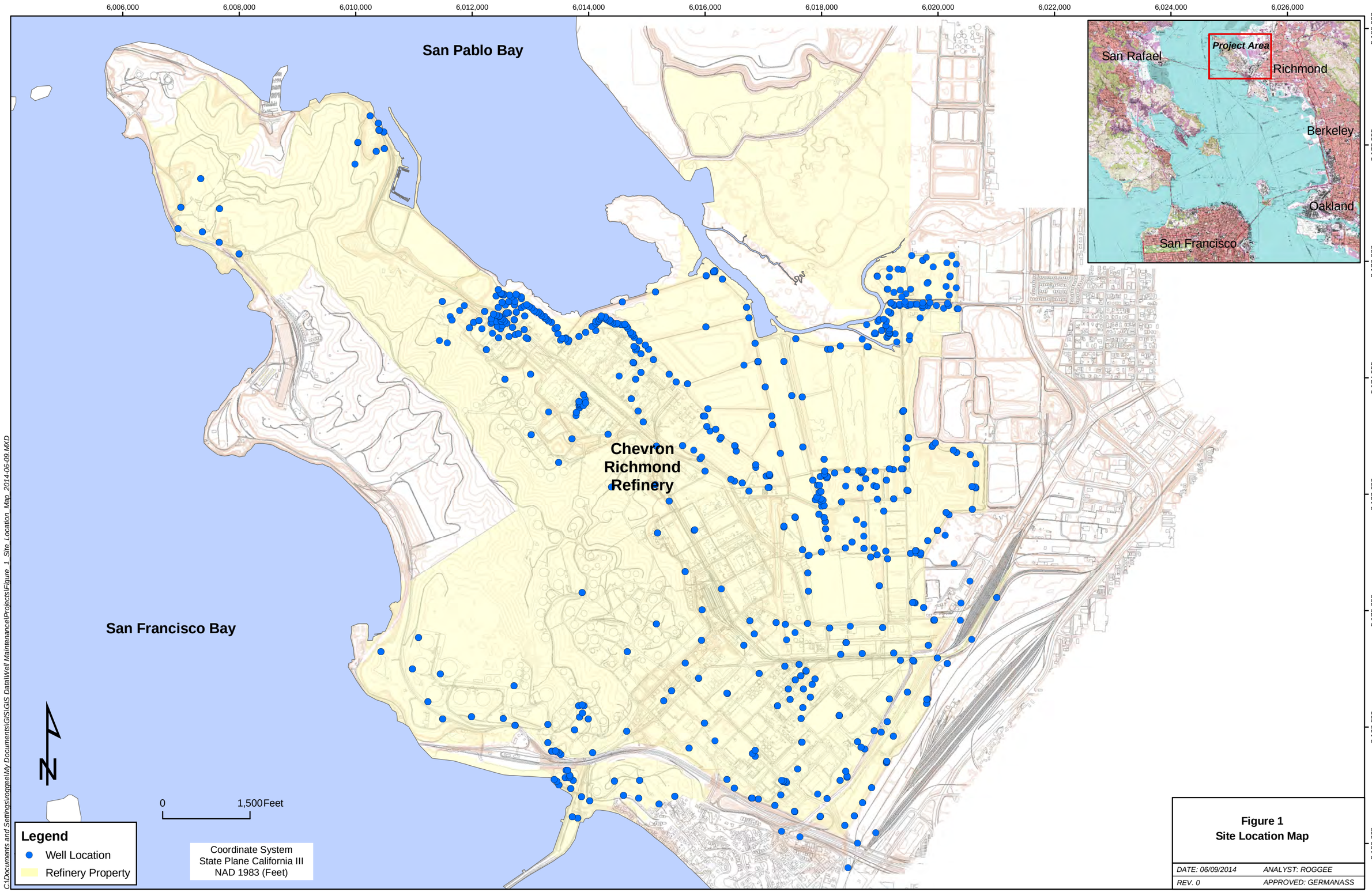
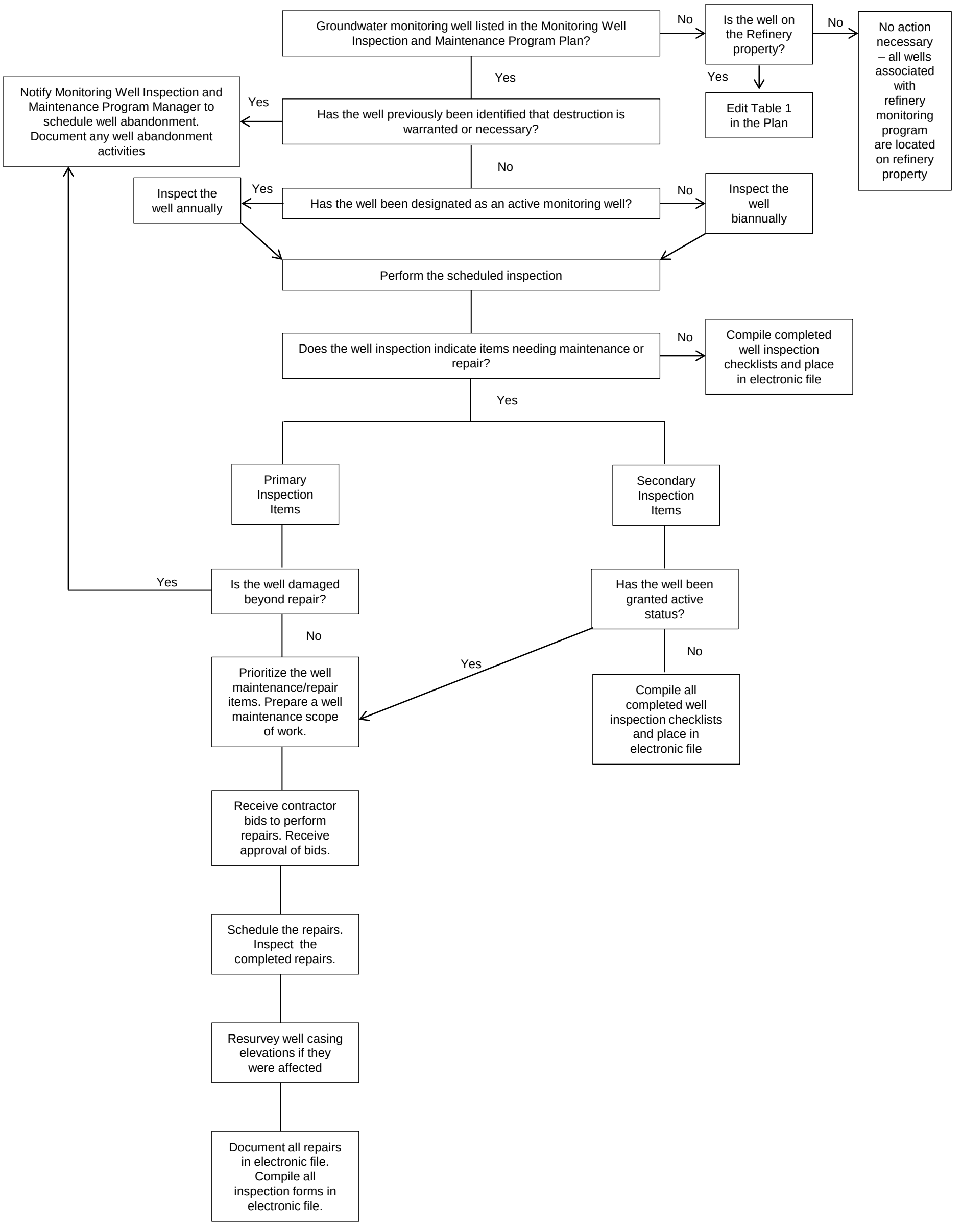


Figure 1
Site Location Map

DATE: 06/09/2014	ANALYST: ROGGEE
REV. 0	APPROVED: GERMANASS

Figure 2
Monitoring Well Inspection and Maintenance Program Flow Chart



Table

Table 1
Refinery Well Construction Information
Chevron Richmond Refinery

Well ID	Top of Casing Elevation (RRD)	Ground Surface Elevation (RRD)	Difference Between GS and TOC (feet)	Well Depth (from GS) (feet)	Constructed Well Depth (from TOC) (feet)	Measured Well Depth (from TOC) (feet)	Difference in Well Depth Values	Date of Measurement	Hard or Soft Bottom?	Depth to Top of Screen (from GS) (feet)	Depth to Bottom of Screen (from GS) (feet)	Top of Screen Elevation (RRD)	Bottom of Screen Elevation (RRD)	Latitude (Decimal)	Longitude (Decimal)
101A	12.44	9.69	2.75	23.00	25.75	26.31	-0.56	6/5/2014	S	3	23	6.69	-13.31	37.955321	-122.392178
101C	11.61	9.64	1.97	65.00	66.97	66.44	0.53	6/5/2014	S	45	65	-35.36	-55.36	37.955296	-122.392197
102A	9.83	6.03	3.80	22.00	25.80	24.92	0.88	5/5/2014	H	1.5	21	4.53	-14.97	37.953934	-122.403618
104A	11.16	8.96	2.20	19.50	21.70	22.25	-0.55	5/16/2014	S	3	19.5	5.96	-10.54	37.946007	-122.383163
106A	12.41	10.43	1.98	20.00	21.98	21.64	0.34	4/11/2014	S	1	20	9.43	-9.57	37.939877	-122.379868
106C	13.00	10.81	2.19	81.50	83.69	77.79	5.90	5/29/2014	S	60	80	-49.19	-69.19	37.939877	-122.379936
108A	9.61	8.32	1.29	21.50	22.79	24.20	-1.41	4/23/2014	H	3.5	21.5	4.82	-13.18	37.951767	-122.385132
108C	11.12	8.20	2.92	104.00	106.92	96.75	10.17	4/23/2014	S	83	103	-74.80	-94.80	37.951748	-122.385315
110A	11.82	9.32	2.50	10.00	12.50	13.44	-0.94	6/3/2014	H	1.5	10	7.82	-0.68	37.951859	-122.400764
114C	11.35	10.49	0.86	38.50	39.36	39.36	0.00	5/19/2014	S	18	38	-7.51	-27.51	37.941990	-122.382500
115C	13.29	11.95	1.34	60.00	61.34	54.03	7.31	5/19/2014	S	35	54	-23.05	-42.05	37.941181	-122.386215
116C	9.85	10.34	-0.49	65.00	64.51	59.39	5.12	5/19/2014	S	45	65	-34.66	-54.66	37.938671	-122.381706
119C	10.11	9.99	0.12	60.00	60.12	59.50	0.62	4/23/2014	S	54	60	-44.01	-50.01	37.945179	-122.380409
121A	10.87	8.46	2.41	16.50	18.91	18.96	-0.05	4/29/2014	S	3	16.5	5.46	-8.04	37.952271	-122.380447
125C	11.99	9.39	2.60	44.00	46.60	45.54	1.06	5/29/2014	H	35	43	-25.61	-33.61	37.935322	-122.378990
128A	13.36	12.18	1.18	8.00	9.18	8.65	0.53	6/2/2014	H	1.5	8	10.68	4.18	37.950462	-122.396393
129A	13.50	13.02	0.48	8.00	8.48	8.90	-0.42	6/4/2014	H	1.5	8	11.52	5.02	37.950157	-122.396706
131A	13.14	12.45	0.69	5.00	5.69	5.84	-0.15	6/4/2014	H	1	5	11.45	7.45	37.949219	-122.396942
132A	13.89	12.60	1.29	13.00	14.29	14.24	0.05	5/6/2014	H	2.5	17	10.10	-4.40	37.953125	-122.404518
134A	14.07	12.78	1.29	12.00	13.29	13.46	-0.17	6/5/2014	H	3	12	9.78	0.78	37.943096	-122.393028
135A	53.82	52.64	1.18	32.00	33.18	33.27	-0.09	4/22/2014	H	23	32	29.64	20.64	37.937286	-122.396873
137A	11.50	10.45	1.05	12.00	13.05	13.04	0.01	6/5/2014	H	7	12	3.45	-1.55	37.938873	-122.389618
138A	10.96	10.11	0.85	12.20	13.05	13.30	-0.25	5/28/2014	H	2	12	8.11	-1.89	37.935413	-122.390869
138C	11.03	10.16	0.87	60.00	60.87	59.91	0.96	5/28/2014	S	54	60	-43.84	-49.84	37.935440	-122.390892
139A	11.21	10.54	0.67	12.00	12.67	12.78	-0.11	4/11/2014	S	1.5	12	9.04	-1.46	37.933205	-122.386368
139C	11.17	10.75	0.42	60.00	60.42	58.18	2.24	4/11/2014	S	55	60	-44.25	-49.25	37.933197	-122.386375
140A	11.28	10.13	1.15	8.00	9.15	9.93	-0.78	5/1/2014	S	2	8	8.13	2.13	37.937935	-122.383858
140C	11.44	10.20	1.24	38.00	39.24	37.59	1.65	5/27/2014	S	34	39	-23.80	-28.80	37.937935	-122.383873
141A	10.86	9.53	1.33	8.50	9.83	9.92	-0.09	5/1/2014	H	2.5	8.5	7.03	1.03	37.937431	-122.382889
142A	10.86	9.53	1.33	8.00	9.33	8.93	0.40	5/1/2014	H	2	8	7.53	1.53	37.937374	-122.384163
143A	11.70	12.56	-0.86	9.00	8.14	10.21	-2.07	5/28/2014	H	3	9	9.56	3.56	37.936558	-122.386215
144A	11.34	10.36	0.98	13.00	13.98	13.99	-0.01	5/28/2014	H	3	13	7.36	-2.64	37.935196	-122.387123
147A	12.44	11.26	1.18	9.00	10.18	9.32	0.86	5/1/2014	S	2	8	9.26	3.26	37.934315	-122.386452
150A	12.08	10.89	1.19	9.00	10.19	10.09	0.10	4/14/2014	H	3	9	7.89	1.89	37.933010	-122.382835
152A	12.88	11.72	1.16	17.00	18.16	23.76	-5.60	5/5/2014	H	2	17	9.72	-5.28	37.953926	-122.404160
155A	14.88	10.45	4.43	7.50	11.93	13.99	-2.06	5/6/2014	H	2.5	7.5	7.95	2.95	37.953476	-122.403130
160A	10.41	10.98	-0.57	13.30	12.73	9.67	3.06	5/23/2014	S	3.5	12.5	7.48	-1.52	37.953785	-122.397598
161A	10.71	11.35	-0.64	14.00	13.36	9.86	3.50	5/23/2014	S	4	13.5	7.35	-2.15	37.955105	-122.392632
164A	9.11	9.56	-0.45	13.30	12.85	12.62	0.23	4/23/2014	H	4.3	9	5.26	0.56	37.951900	-122.382957
164C	8.78	9.39	-0.61	61.00	60.39	56.78	3.61	4/23/2014	S	40	60	-30.61	-50.61	37.951893	-122.382904
165A	8.73	9.26	-0.53	14.00	13.47	13.95	-0.48	4/23/2014	H	4	13.5	5.26	-4.24	37.948936	-122.380714
165C	8.73	9.11	-0.38	70.00	69.62	49.21	20.41	4/23/2014	H	50	70	-40.89	-60.89	37.948883	-122.380760
167A	13.93	14.70	-0.77	14.00	13.23	12.99	0.24	5/22/2014	S	4	14	10.70	0.70	37.951981	-122.404907
168C	14.89	14.07	0.82	55.00	55.82	NM	NA	6/5/2014	NA	45	55	-30.93	-40.93	37.952774	-122.404793
169A	14.20	12.44	1.76	13.50	15.26	15.68	-0.42	5/28/2014	H	3.5	13.5	8.94	-1.06	37.953007	-122.404900
170A	16.74	16.05	0.69	14.00	14.69	15.69	-1.00	5/15/2014	H	4	14	12.05	2.05	37.952473	-122.404099
173A	18.31	18.95	-0.64	16.00	15.36	15.40	-0.04	5/15/2014	S	5.7	16	13.25	2.95	37.952644	-122.405380
174A	17.55	18.00	-0.45	15.80	15.35	13.82	1.53	5/22/2014	S	5.8	15.8	12.20	2.20	37.952763	-122.406105
175A	16.41	16.08	0.33	19.80	20.13	20.49	-0.36	5/22/2014	S	10	20	6.08	-3.92	37.952419	-122.406662
177A	10.59	10.91	-0.32	15.50	15.18	13.31	1.87	5/23/2014	H	4	14	6.91	-3.09	37.954304	-122.395622
178A	10.11	9.86	0.25	15.00	15.25	12.46	2.79	4/30/2014	S	3	14	6.86	-4.14	37.951946	-122.389641
178C	10.92	11.23	-0.31	76.50	76.19	70.26	5.93	4/23/2014	S	54	74	-42.77	-62.77	37.953163	-122.390022
179A	8.62	9.20	-0.58	15.00	14.42	13.43	0.99	4/23/2014	S	4	14	5.20	-4.80	37.952213	-122.387207
181A	10.10	10.00	0.10	20.20	20.30	21.42	-1.12	4/25/2014	H	5	20	5.00	-10.00	37.945164	-122.388634
182A	13.55	11.96	1.59	18.20	19.79	21.39	-1.60	4/25/2014	H	2	18	9.96	-6.04	37.945366	-122.390236
183A	13.74	12.99	0.75	13.70	14.45	15.56	-1.11	5/28/2014	H	1.5	13.5	11.49	-0.51	37.946457	-122.392776
184A	14.93	13.94	0.99	15.50	16.49	14.37	2.12	5/1/2014	S	3	15	10.94	-1.06	37.947495	-122.391541
186A	12.98	12.87	0.11	15.00	15.11	17.96	-2.85	5/16/2014	S	1	15	11.87	-2.13	37.945740	-122.385170
187A	9.41	8.01	1.40	12.00	13.40	13.76	-0.36	5/16/2014	S	2	12	6.01	-3.99	37.945911	-122.384743
189A	7.71	7.45	0.26	13.00	13.26	14.63	-1.37	5/16/2014	S	2	15	5.45	-7.55	37.946037	-122.382332
190A	13.24	12.05	1.19	18.00	19.19	21.63	-2.44	5/16/2014	S	3	18	9.05	-5.95	37.945667	-122.382889
191A	14.40	12.35	2.05	15.00	17.05	17.19	-0.14	5/16/2014	S	3	15	9.35	-2.65	37.944721	-122.382172
193A	13.62	11.47	2.15	14.00	16.15	16.47	-0.32	5/19/2014	S	2	14	9.47	-2.53	37.942390	-122.382904
197A	13.38	12.89	0.49	9.50	9.99	13.32	-3.33	6/5/2014	S	1.5	11.5	11.39	1.39	37.948154	-122.396194
198A	12.07	10.63	1.44	13.00	14.44	13.58	0.86	6/2/2014	S	1.5	12	9.13	-1.37	37.950062	-122.394295
200A	16.14	16.33	-0.19	14.00	13.81	14.45	-0.64	5/28/2014	H	4	14	12.33	2.33	37.953213	-122.405785
201A	9.03	9.99	-0.96	13.00	12.04	9.88	2.16	5/6/2014	S	3	13	6.99	-3.01	37.953651	-122.404755
203A	10.92	11.36	-0.44	13.00	12.56	10.24	2.32	5/22/2014	S	3	13	8.36	-1.64	37.952374	-122.403397
204A	14.61	15.23	-0.62	13.00	12.38	10.03	2.35	5/7/2014	H	3	13	12.23	2.23	37.951992	-122.403267
208C	16.01	14.82	1.19	60.75	61.94	60.32	1.62	4/30/2014	S	45	60	-30.99	-45.99	37.946548	-122.392685
209A	8.89	5.72	3.17	13.00	16.17	17.29	-1.12	5/5/2014	S	3	13	2.72	-7.28	37.953999	-122.403885
210A	10.99	9.54	1.45	18.00	19.45	20.06	-0.61	5/16/2014	H	3	13	6.54	-3.46	37.946121	-122.381248
212A	12.58	10.85	1.73	13.00	14.73	15.53	-0.80	5/16/2014	S	3	13	7.85	-2.15	37.944176	-122.381767
223C	9.84	6.68	3.16	50.00	53.16	54.48	-1.32	5/15/2014	H	43	50	-36.32	-43.32	37.954037	-122.403931
224C	13.51	10.57	2.94	44.00	46.94	47.65	-0.71	5/16/2014	H	39	44	-28.43	-33.43	37.953171	-122.404457
226A	14.57	15.36	-0.79	9.50	8.71	8.61	0.10	5/22/2014	H	6.5	9.5	8.86	5.86	37.948524	-122.400192
227A	14.82	15.71	-0.89	23.00	22.11	20.31	1.80	5/22/2014	S	8	18	7.71	-2.29	37.948856	-122.399788
232A	9.48	8.05	1.43	14.50	15.93	16.96	-1.03	5/22/2014	H	3	13	5.05	-4.95	37.947655	-122.380379
232C	10.33	8.07	2.26	45.00	47.26	45.45	1.81	5/21/2014	S	33	43	-24.93	-34.93	37.947598	-122.380409
233A	9.20	7.53	1.67	13.00	14.67	14.62	0.05	5/22/2014	H	2.5	12.5	5.03	-4.97	37.947102	-122.377701
234A	9.51	7.82	1.69	14.50	16.19	15.50	0.69	5/27/2014	H	3	13	4.82	-5.18	37.945351	-122.376328
234C	9.86	8.54	1.32	47.00	48.32	46.62	1.70	5/23/2014	S	35	45	-26.46	-36.46	37.945385	-122.376358
235A	7.71	7.84	-0.13	13.00	12.87	14.92	-2.05	4/16/2014	S	2.5	12.5	5.34	-4.66	37.943291	-122.378563
235C	9.58	9.85	-0.27	41.00	40.73	41.79	-1.06	5/23/2014	H	30	40	-20.15	-30.15	37.943317	-122.378548
236A	12.59	NA	1.66	10.00	11.66	10.94	0.72	4/16/2014	S	2.5	9.5	8.43	1.43	37.942341	-122.379799
236C	12.71	11.54	1.17	61.50	62.67	63.40	-0.73	5/2/2014	S	50.5	60.5	-38.96	-48.96	37.942345	-122.379837
237A	12.56	10.78	1.78	13.00	14.78	18.86	-4.08	4/23/2014	H	3	13	7.78	-2.22	37.945164	-122.380363
238A	10.54	8.05	2.49	13.50	15.99	15.53	0.46	4/28/2014	H	2.5	12.5	5.55	-4.45	37.953972	-122.381607
238C	10.32	7.44	2.88	32.00	34.88	35.49	-0.61	4/28/2014	H	27	32	-19.56	-24.56	37.953999	-122.381592
239A	12.22	10.46	1.76	13.50	15.26	15.60	-0.34	4/28/2014	H	3	13	7.46	-2.54	37.952560	-122.381645
240A	7.35	5.52	1.83	6.50	8.33	8.89	-0.56	5/27/2014	H	2.5	6.5	3.02	-0.98	37.944061	-122.377884
243A	8.12	8.61	-0.49	11.00	10.51	7.53	2.98	5/16/2014	S	2.5	10.5	6.11	-1.89	37.944756	-122.385773
244A	8.48	9.01	-0.53	12.50	11.97	11.92	0.05	5/16/2014	S	2.5	12.5	6.51	-3.49	37.945553	-122.386032
248A-2	10.26	10.70	-0.44	13.00	12.56	14.11	-1.55	4/30/2014	S	3	13	7.70	-2.30	37.949894	-122.388985
249A	11.18	11.60	-0.42	13.00	12.58	12.24	0.34	4/29/2014	S	3	13	8.60	-1.40	37.948547	-122.388565
250A	11.44	11.87	-0.43	13.00	12.57	12.61	-0.04	4/29/2014	S	5	15	6.87	-3.13	37.946793	-122.387993
251C	13.53	10.96	2.57	53.00	55.57	56.53	-0.96	5/19/2014	S	43	53	-32.04	-42.04	37.942390	-122.384010
252C	13.88	11.47	2.41	35.00	37.41	36.12	1.29	5/27/2014	H	23	33	-11.53	-21.53	37.940651	-122.381935
253C	12.48	10.09	2.39	43.00	45.39	45.07	0.32	5/19/2014	S	33	43	-22.91	-32.91	37.938606	-122.384857
254C	11.55	9.40	2.15	46.00	48.15	48.98	-0.83	5/19/2014	S	36	46	-26.60	-36.60	37.940311	-122.386154
258A	12.23	9.80	2.43	25.00	27.43	27.41	0.02	5/6/2014	H	5	20	4.80	-10.20	37.953041	-122.403381
260A	9.52	7.92	1.60	22.00	23.60	24.39	-0.79	5/27/2014	S	12	22	-4.08	-14.08	37.961571	-122.412003
262A	7.61	7.26	0.35	18.50	18.85	20.27	-1.42	5/27/2014	S	9	18.5	-1.74	-11.24	37.961983	-122.412346
276A	8.79	9.44	-0.65	15.00	14.35	14.20	0.15	4/23/2014	S	5	15	4.44	-5.56	37.951920	-122.384544
289A	13.88	12.73	1.15	12.00	13.15	12.21	0.94	5/1/2014	S	4	12	8.73	0.73	37.955593	-122.381218
290A	8.91	6.76	2.15	11.50	13.65	13.53	0.12	4/28/2014	H	1.5	11.5	5.26	-4.74	37.954056	-122.380753
294A	7.63	5.73	1.90	16.00	17.90	17.90	0.00	4/16/2014	H	10.5	16	-4.77	-10.27	37.952515	-122.382462
295A	8.95	6.84	2.11	8.00	10.11	9.72	0.39	4/29/2014	H	2	8	4.84	-1.16	37.952461	-122.381706
296A	7.33	5.49	1.84	9.00	10.84	10.52	0.32	4/16/2014	H	2	9	3.49	-3.51	37.952152	-122.381203
311A	13.27	10.77	2.50	12.00	14.50	14.34	0.16	5/1/2014	H	4	12	6.77	-1.23	37.956257	-122.380409
314A	12.40	13.00	-0.60	11.00	10.40	10.82	-0.42	4/11/2014	H	3.5	11	9.50	2.00	37.930954	-122.390327
315A	18.10	15.70	2.40	10.50	12.90	12.92	-0.02	4/11/2014	S	2	10.5	13.70	5.20	37.930473	-122.388893
316A	18.50	16.50	2.00	14.50	16.50	17.09	-0.59	4/11/2014	H	9.5	14.5	7.00	2.00	37.930187	-122.387894
320C	7.31	7.90	-0.59	40.50	39.91	35.88	4.03	5/29/2014	S	25.5	40.5	-17.60	-32.60	37.932362	-122.381294
323A	11.44	12.20	-0.76	10.00	9.24	9.38	-0.14	4/14/2014	H	2	10	10.20	2.20	37.929699	-122.385208

Table 1
Refinery Well Construction Information
Chevron Richmond Refinery

Well ID	Top of Casing Elevation (RRD)	Ground Surface Elevation (RRD)	Difference Between GS and TOC (feet)	Well Depth (from GS) (feet)	Constructed Well Depth (from TOC) (feet)	Measured Well Depth (from TOC) (feet)	Difference in Well Depth Values	Date of Measurement	Hard or Soft Bottom?	Depth to Top of Screen (from GS) (feet)	Depth to Bottom of Screen (from GS) (feet)	Top of Screen Elevation (RRD)	Bottom of Screen Elevation (RRD)	Latitude (Decimal)	Longitude (Decimal)
336F	111.81	112.21	-0.40	94.50	94.10	94.32	-0.22	4/21/2014	S	65	94.5	47.21	17.71	37.930138	-122.394806
337F	71.07	68.43	2.64	52.00	54.64	54.30	0.34	4/21/2014	H	27	52	41.43	16.43	37.930393	-122.396027
338F	59.36	60.04	-0.68	60.70	60.02	59.64	0.38	4/21/2014	S	22.7	60.7	37.34	-0.66	37.930500	-122.396919
340AT	13.59	14.25	-0.66	14.00	13.34	14.00	-0.66	6/9/2014	H	4	14	10.25	0.25	37.931118	-122.400917
341F	91.20	89.78	1.42	69.00	70.42	NM	NA	6/4/2014	NA	44	69	45.78	20.78	37.953640	-122.408310
343CT	15.08	15.53	-0.45	25.00	24.55	24.48	0.07	5/5/2014	H	20	25	-4.47	-9.47	37.953941	-122.405098
344F	120.48	121.61	-1.13	93.00	91.87	NM	NA	4/17/2014	NA	68	93	53.61	28.61	37.933777	-122.401520
345AT	48.41	48.91	-0.50	20.00	19.50	19.75	-0.25	4/17/2014	S	10	20	38.91	28.91	37.932510	-122.400963
346F	109.95	107.36	2.59	111.00	113.59	110.53	3.06	4/22/2014	H	68	108	39.36	-0.64	37.937756	-122.409317
347F	101.09	102.19	-1.10	35.00	33.90	33.88	0.02	4/17/2014	H	11	35	91.19	67.19	37.936275	-122.409653
348F	99.09	99.74	-0.65	42.00	41.35	41.48	-0.13	4/22/2014	H	17	42	82.74	57.74	37.934757	-122.408676
349F	101.02	99.27	1.75	51.00	52.75	52.74	0.01	4/17/2014	H	31	51	68.27	48.27	37.934074	-122.406075
350F	59.86	60.05	-0.19	24.00	23.81	24.01	-0.20	4/17/2014	H	19	24	41.05	36.05	37.934025	-122.404175
351AT	49.83	50.47	-0.64	6.00	5.36	5.48	-0.12	4/17/2014	S	2.5	6	47.97	44.47	37.933720	-122.403481
351CT	49.93	50.14	-0.21	30.50	30.29	30.05	0.24	6/9/2014	S	25.5	30.5	24.64	19.64	37.933716	-122.403465
362AT	14.52	15.30	-0.78	13.50	12.72	11.42	1.30	5/22/2014	S	3.5	13.5	11.80	1.80	37.952665	-122.406433
364F	109.78	110.46	-0.68	55.00	54.32	53.67	0.65	4/17/2014	S	15	55	95.46	55.46	37.935581	-122.403580
365F	61.08	59.27	1.81	45.00	46.81	46.80	0.01	4/22/2014	H	5	45	54.27	14.27	37.933941	-122.407784
367F	123.99	125.05	-1.06	101.00	99.94	99.12	0.82	4/21/2014	S	76	101	49.05	24.05	37.931244	-122.395996
368F	82.06	82.65	-0.59	93.00	92.41	92.89	-0.48	4/21/2014	S	63	93	19.65	-10.35	37.930225	-122.398926
369S	11.46	9.75	1.71	19.00	20.71	21.93	-1.22	5/1/2014	S	13	19	-3.25	-9.25	37.955238	-122.382431
370A	10.87	8.67	2.20	9.70	11.90	12.16	-0.26	5/1/2014	H	3.5	9.7	5.17	-1.03	37.956051	-122.379753
375C	18.01	16.62	1.39	82.50	83.89	83.09	0.80	5/7/2014	S	70	80	-53.38	-63.38	37.951958	-122.403183
377C	13.98	12.14	1.84	140.00	141.84	138.72	3.12	6/2/2014	S	126	136	-113.86	-123.86	37.950947	-122.396881
378C	15.15	13.19	1.96	54.00	55.96	55.02	0.94	4/30/2014	S	43	53	-29.81	-39.81	37.943104	-122.392990
379C	14.67	12.25	2.42	41.50	43.92	41.59	2.33	4/30/2014	S	28.5	38.5	-16.25	-26.25	37.940338	-122.391357
380C	12.52	10.20	2.32	35.50	37.82	36.26	1.56	4/30/2014	S	23	33	-12.80	-22.80	37.938259	-122.389336
381C	12.21	12.62	-0.41	47.50	47.09	47.81	-0.72	4/15/2014	H	35	45	-22.38	-32.38	37.936550	-122.386223
382C	12.93	10.55	2.38	37.50	39.88	38.05	1.83	4/15/2014	H	25	35	-14.45	-24.45	37.933189	-122.391556
387AT	17.65	14.91	2.74	15.00	17.74	17.28	0.46	4/15/2014	H	6.1	15	8.81	-0.09	37.957829	-122.423996
388AT	17.91	14.92	2.99	23.00	25.99	23.01	2.98	4/15/2014	H	6	19.4	8.92	-4.48	37.956825	-122.424133
389F	69.88	67.75	2.13	72.50	74.63	74.61	0.02	4/15/2014	H	50.7	71.5	17.05	-3.75	37.956692	-122.422684
390AT	38.14	38.77	-0.63	38.00	37.37	37.32	0.05	4/15/2014	H	27.5	38	11.27	0.77	37.956219	-122.421661
391AT	34.07	31.81	2.26	20.00	22.26	21.41	0.85	4/15/2014	H	8.4	18.4	23.41	13.41	37.955681	-122.420464
392F	77.81	77.91	-0.10	80.00	79.90	83.28	-3.38	4/15/2014	H	60	80	17.91	-2.09	37.959194	-122.422844
393F	89.69	87.10	2.59	83.00	85.59	85.70	-0.11	4/15/2014	H	57.7	82.7	29.40	4.40	37.957813	-122.421677
394F	40.31	41.20	-0.89	39.00	38.11	37.57	0.54	5/22/2014	S	19.5	38.5	21.70	2.70	37.950279	-122.402962
395F	108.62	109.38	-0.76	55.50	54.74	54.43	0.31	5/23/2014	S	35.7	55	73.68	54.38	37.950016	-122.404480
396AT	64.25	64.86	-0.61	26.00	25.39	25.48	-0.09	5/23/2014	S	11	26	53.86	38.86	37.947437	-122.402855
398AT	19.29	16.99	2.30	15.00	17.30	17.70	-0.40	5/22/2014	S	5	15	11.99	1.99	37.947277	-122.400421
399F	77.98	79.04	-1.06	27.70	26.64	26.43	0.21	5/23/2014	S	8.1	27.1	70.94	51.94	37.946167	-122.401199
400F	230.76	231.19	-0.43	137.00	136.57	136.59	-0.02	6/5/2014	S	108	136.5	123.19	94.69	37.945045	-122.398018
401AT	17.14	17.49	-0.35	13.00	12.65	12.31	0.34	5/22/2014	S	3	13	14.49	4.49	37.947525	-122.398277
403AT	21.43	22.41	-0.98	21.00	20.02	23.52	-3.50	5/23/2014	S	11	21	11.41	1.41	37.945202	-122.395416
405AT	26.35	26.69	-0.34	23.00	22.66	19.81	2.85	6/9/2014	S	8	23	18.69	3.69	37.942921	-122.395210
406F	158.53	157.79	0.74	143.00	143.74	143.70	0.04	4/21/2014	S	114.3	142.5	43.49	15.29	37.930523	-122.393867
407F	114.77	111.09	3.68	95.00	98.68	99.09	-0.41	4/21/2014	S	64.5	94.5	46.59	16.59	37.931179	-122.397476
408AT	14.91	14.62	0.29	14.50	14.79	14.44	0.35	4/25/2014	H	4.5	14	10.12	0.62	37.930405	-122.399429
419AT	24.44	25.08	-0.64	12.50	11.86	11.72	0.14	4/22/2014	H	2	12	23.08	13.08	37.941135	-122.393524
420F	20.71	21.26	-0.55	33.00	32.45	30.85	1.60	4/22/2014	H	21.5	31.5	-0.24	-10.24	37.939335	-122.392471
421AT	40.38	40.75	-0.37	11.90	11.53	11.69	-0.16	4/22/2014	H	2	11.1	38.75	29.65	37.937908	-122.392464
422AT	27.35	24.48	2.87	17.00	19.87	20.40	-0.53	4/22/2014	H	2.3	16.3	22.18	8.18	37.936806	-122.393417
423AT	14.06	14.60	-0.54	15.50	14.96	15.23	-0.27	4/17/2014	H	5	15	9.60	-0.40	37.935493	-122.394188
424AT	16.51	16.75	-0.24	18.50	18.26	17.91	0.35	4/21/2014	H	3.5	17.9	13.25	-1.15	37.935013	-122.394646
425F	157.32	157.90	-0.58	70.50	69.92	69.71	0.21	4/25/2014	S	36	65	121.90	92.90	37.938618	-122.395172
427F	274.76	275.65	-0.89	73.00	72.11	70.84	1.27	4/25/2014	S	47.5	67.5	228.15	208.15	37.940048	-122.399635
428F	61.47	62.28	-0.81	12.30	11.49	11.38	0.11	4/17/2014	H	2	12	60.28	50.28	37.932930	-122.401497
429F	48.94	49.78	-0.84	13.50	12.66	12.15	0.51	4/21/2014	H	3.2	13.2	46.58	36.58	37.932503	-122.398819
430F	43.85	40.61	3.24	13.30	16.54	16.61	-0.07	4/21/2014	H	3	13	37.61	27.61	37.933540	-122.396812
431F	107.98	108.69	-0.71	74.80	74.09	75.61	-1.52	4/23/2014	S	54.5	74.5	54.19	34.19	37.933556	-122.399910
499A	13.13	13.82	-0.69	17.60	16.91	17.04	-0.13	6/5/2014	S	10.5	17.3	3.32	-3.48	37.952404	-122.399132
500A	11.66	12.26	-0.60	12.70	12.10	12.99	-0.89	6/3/2014	S	6.8	12.7	5.46	-0.44	37.950920	-122.396843
502C	14.65	11.93	2.72	57.50	60.22	58.50	1.72	5/21/2014	S	46	56	-34.07	-44.07	37.948647	-122.396530
505A	15.39	13.51	1.88	15.00	16.88	17.07	-0.19	5/16/2014	S	8	15	5.51	-1.49	37.944565	-122.384300
506C	17.78	15.20	2.58	39.00	41.58	42.52	-0.94	5/27/2014	H	33	39	-17.80	-23.80	37.945244	-122.383202
515AT	15.13	11.45	3.68	16.00	19.68	19.69	-0.01	4/22/2014	H	5.5	15	5.95	-3.55	37.936108	-122.392601
516AT	10.69	11.38	-0.69	7.50	6.81	7.41	-0.60	6/5/2014	H	2.5	7	8.88	4.38	37.937702	-122.389954
517A	12.38	12.93	-0.55	14.00	13.45	17.41	-3.96	6/5/2014	H	3	13	9.93	-0.07	37.938805	-122.388046
518A	14.34	10.72	3.62	13.00	16.62	17.00	-0.38	5/29/2014	H	2.5	12.5	8.22	-1.78	37.934822	-122.386353
519A	14.35	10.72	3.63	13.00	16.63	17.08	-0.45	4/14/2014	H	2.5	12.5	8.22	-1.78	37.935329	-122.385910
523A	10.02	10.61	-0.59	13.00	12.41	12.50	-0.09	4/14/2014	H	2.5	12.5	8.11	-1.89	37.936775	-122.387482
524A	11.50	8.23	3.27	10.00	13.27	13.45	-0.18	5/28/2014	H	2.5	9.7	5.73	-1.47	37.936398	-122.388992
525A	13.16	9.68	3.48	13.00	16.48	16.81	-0.33	5/28/2014	H	2.5	12.5	7.18	-2.82	37.936180	-122.385666
529AT	13.55	14.18	-0.63	19.00	18.37	18.55	-0.18	4/25/2014	S	7	17	7.18	-2.82	37.931301	-122.400192
530A	12.07	9.77	2.30	12.00	14.30	14.15	0.15	4/14/2014	H	3	12	6.77	-2.23	37.932755	-122.389145
531A	13.31	10.41	2.90	8.00	10.90	10.68	0.22	4/29/2014	H	3	8	7.41	2.41	37.932625	-122.389290
535AT	45.15	45.51	-0.36	20.00	19.64	19.39	0.25	4/17/2014	H	5	20	40.51	25.51	37.932529	-122.401230
549AT	53.24	50.10	3.14	4.50	7.64	7.51	0.13	5/5/2014	H	1.5	4.3	48.60	45.80	37.952763	-122.407715
550A	8.71	9.39	-0.68	19.00	18.32	19.03	-0.71	6/3/2014	H	4	19	5.39	-9.61	37.953060	-122.398575
551A	9.07	9.70	-0.63	15.00	14.37	14.42	-0.05	5/16/2014	H	5	15	4.70	-5.30	37.946171	-122.380676
552A	10.18	7.90	2.28	13.50	15.78	15.46	0.32	5/23/2014	H	3.5	13.5	4.40	-5.60	37.942142	-122.379524
554A	7.13	7.70	-0.57	5.00	4.43	4.65	-0.22	5/29/2014	H	1.2	5	6.50	2.70	37.932316	-122.381317
555F	94.54	94.99	-0.45	80.00	79.55	79.22	0.33	4/22/2014	S	39.5	79.5	55.49	15.49	37.937054	-122.411537
556A	8.37	8.73	-0.36	4.00	3.64	3.94	-0.30	4/11/2014	H	2	4	6.73	4.73	37.937149	-122.380608
557AT	15.27	15.89	-0.62	32.00	31.38	30.37	1.01	4/17/2014	S	5	32	10.89	-16.11	37.931202	-122.401070
558AT	19.54	19.96	-0.42	35.00	34.58	34.79	-0.21	4/17/2014	S	10	30	9.96	-10.04	37.930939	-122.400787
559A	9.18	7.03	2.15	8.00	10.15	10.15	0.00	4/29/2014	H	3	8	4.03	-0.97	37.952950	-122.383011
560A	9.03	6.90	2.13	10.00	12.13	11.89	0.24	4/29/2014	H	3	10	3.90	-3.10	37.953106	-122.382347
564A	9.89	7.99	1.90	8.00	9.90	10.18	-0.28	5/1/2014	H	3	8	4.99	-0.01	37.955944	-122.378304
565C	13.24	10.63	2.61	79.50	82.11	81.47	0.64	4/28/2014	S	49.5	79.5	-38.87	-68.87	37.952579	-122.381706
566C	8.09	5.40	2.69	59.00	61.69	60.95	0.74	4/29/2014	S	49	59	-43.60	-53.60	37.952557	-122.382507
569C	14.15	12.41	1.74	51.00	52.74	53.71	-0.97	5/1/2014	S	41	51	-28.59	-38.59	37.955325	-122.378107
576F	195.52	196.52	-1.00	177.50	176.50	177.87	-1.37	4/28/2014	S	137	177	59.52	19.52	37.934704	-122.399704
581A	16.60	14.00	2.60	20.00	22.60	22.50	0.10	5/21/2014	S	5	20	9.00	-6.00	37.948471	-122.392548
587C	12.48	9.95	2.53	60.00	62.53	62.56	-0.03	4/25/2014	S	50	60	-40.05	-50.05	37.945168	-122.388672
588A	12.06	9.80	2.26	16.00	18.26	18.28	-0.02	6/2/2014	H	5.5	15.5	4.30	-5.70	37.951080	-122.395668
589A	9.53	9.90	-0.37	18.50	18.13	17.82	0.31	6/2/2014	H	6	18.5	3.90	-8.60	37.950428	-122.394714
590A	14.09	11.90	2.19	18.00	20.19	20.39	-0.20	6/2/2014	H	6	18	5.90	-6.10	37.949970	-122.393608
591A	16.39	14.20	2.19	19.00	21.19	21.19	0.00	5/21/2014	S	5.5	19	8.70	-4.80	37.948814	-122.392357
593A	13.77	13.02	0.75	17.90	18.65	20.29	-1.64	5/1/2014	H	3	13	10.02	0.02	37.946846	-122.390625
594A	15.01	13.50	1.51	19.90	21.41	21.91	-0.50	5/1/2014	H	8	19.5	5.50	-6.00	37.945705	-122.388809
595AT	13.69	11.53	2.16	12.50	14.66	14.76	-0.10	5/5/2014	H	4	12.5	7.53	-0.97	37.954250	-122.404991
610A	9.51	9.79	-0.28	13.00	12.72	12.38	0.34	5/16/2014	S	3	13	6.79	-3.21	37.946087	-122.383995
635C	12.16	9.61	2.55	41.20	43.75	43.56	0.19	5/27/2014	S	34	41	-24.39	-31.39	37.961647	-122.412277
636C	15.51	11.84	3.67	34.50	38.17	38.13	0.04	4/15/2014	S	29	34	-17.16	-22.16	37.962315	-122.412827
637F	12.44	9.98	2.46	59.60	62.06	61.84	0.22	4/15/2014	S	49	59	-39.02	-49.02	37.961670	-122.412292
638C	18.76	17.00	1.76	42.50	44.26	45.20	-0.94	6/5/2014	H	32.5	42.5	NA	NA	37.948368	-122.400215
641A	10.13	8.85	1.28	7.00	8.28	9.32	-1.04	4/14/2014	H	3	5	5.85	3.85	37.935658	-122.380150
642A	11.35	9.18	2.17	7.00	9.17	9.63	-0.46	5/29/2014	H	3	7	6.18	2.18	37.935131	-122.378990
643A	10.95	8.67	2.28	12.00	14.28	13.91	0.37	5/1/2014	S	3	12	5.67	-3.33	37.956173	-122.379547
644A	17.24	15.24	2.00	25.00	27.00	26.74	0.26	4/30/2014	S	6	25	9.24	-9.76	37.947056	-122.393837
645A	15.21	12.85	2.36	17.00	19.36	19.05	0.31	5/28/2014	H	7	17	5.85	-4.15	37.945522	-122.390907
647A	12.02	9.62	2.40	20.00	22.40	22.40	0.00	5/19/2014	S	6	20	3.62	-10.38	37.945873	-122.392464
648A	10.90	8.33	2.57	7.50	10.07	9.64	0.43	4/10/2014	H	3.5	7.5	4.83	0.83	37.936129	-122.380331
649A	11.54	9.02	2.52	8.00	10.52	10.55	-0.03	5/29/2014	H	3	8	6.02	1.02	37.937279	-122.378410

Table 1
Refinery Well Construction Information
Chevron Richmond Refinery

Well ID	Top of Casing Elevation (RRD)	Ground Surface Elevation (RRD)	Difference Between GS and TOC (feet)	Well Depth (from GS) (feet)	Constructed Well Depth (from TOC) (feet)	Measured Well Depth (from TOC) (feet)	Difference in Well Depth Values	Date of Measurement	Hard or Soft Bottom?	Depth to Top of Screen (from GS) (feet)	Depth to Bottom of Screen (from GS) (feet)	Top of Screen Elevation (RRD)	Bottom of Screen Elevation (RRD)	Latitude (Decimal)	Longitude (Decimal)
650A	12.83	10.83	2.00	15.00	17.00	16.28	0.72	5/19/2014	H	5	15	5.83	-4.17	37.942429	-122.382301
651A	13.82	11.19	2.63	14.00	16.63	15.97	0.66	5/19/2014	H	4	14	7.19	-2.81	37.942093	-122.382111
652A	13.65	11.53	2.12	15.00	17.12	16.70	0.42	5/19/2014	S	5	15	6.53	-3.47	37.942276	-122.381592
653A	13.23	11.13	2.10	12.00	14.10	13.85	0.25	5/19/2014	H	4	12	7.13	-0.87	37.941921	-122.381493
654C	11.47	9.76	1.71	35.00	36.71	36.26	0.45	4/30/2014	S	25	35	-15.24	-25.24	37.945763	-122.388626
655C	10.73	9.24	1.49	40.00	41.49	41.48	0.01	5/27/2014	S	30	40	-20.76	-30.76	37.944679	-122.385529
657A	14.00	11.54	2.46	14.00	16.46	16.71	-0.25	5/19/2014	H	4	14	7.54	-2.46	37.942677	-122.383621
659A	13.29	11.02	2.27	18.00	20.27	20.08	0.19	5/1/2014	S	4	18	7.02	-6.98	37.947094	-122.390709
660A	12.14	10.83	1.31	NA	NA	15.41	NA	5/6/2014	H	NA	NA	NA	NA	37.953400	-122.404968
661A	18.58	18.81	-0.23	NA	NA	14.80	NA	5/19/2014	S	NA	NA	NA	NA	37.952404	-122.404808
663A	16.69	17.00	-0.31	NA	NA	18.09	NA	5/28/2014	H	NA	NA	NA	NA	37.952038	-122.404305
664A	13.47	11.11	2.36	NA	NA	12.01	NA	4/25/2014	H	NA	NA	NA	NA	37.944984	-122.389824
667C	15.47	13.76	1.71	50.00	51.71	51.46	0.25	4/30/2014	S	NA	NA	NA	NA	37.947987	-122.392410
668AT	9.01	9.48	-0.47	15.00	14.53	14.64	-0.11	4/25/2014	H	NA	NA	NA	NA	37.929466	-122.399956
669AT	9.54	9.98	-0.44	16.00	15.56	15.60	-0.04	4/25/2014	H	NA	NA	NA	NA	37.929409	-122.399620
670C	14.69	11.49	3.20	47.00	50.20	50.17	0.03	5/7/2014	S	42	47	-30.51	-35.51	37.952007	-122.400932
671A	8.44	6.51	1.93	13.00	14.93	15.57	-0.64	5/30/2014	H	2	10.5	4.51	-3.99	37.952682	-122.392593
672A	11.82	9.39	2.43	17.00	19.43	19.50	-0.07	5/16/2014	S	7	17	2.39	-7.61	37.946136	-122.382263
673A	14.53	11.87	2.66	17.00	19.66	19.75	NA	5/1/2014	S	7	17	4.87	-5.13	37.947857	-122.391869
674C	13.20	10.68	2.52	40.00	42.52	42.06	0.46	5/1/2014	S	31	40	-20.32	-29.32	37.947109	-122.390724
675A	10.38	10.94	-0.56	15.50	14.94	12.64	2.30	5/23/2014	S	7	17	3.94	-6.06	37.953644	-122.390182
677A	12.43	9.33	3.10	16.00	19.10	17.18	1.92	4/30/2014	H	6	16	3.33	-6.67	37.945736	-122.388603
678C	11.90	9.08	2.82	67.00	69.82	69.55	0.27	5/27/2014		57	67	-47.92	-57.92	37.946026	-122.383179
679C	15.36	12.46	2.90	50.00	52.90	53.11	-0.21	5/21/2014	S	40	50	-27.54	-37.54	37.945740	-122.385201
680C	11.06	8.03	3.03	40.00	43.03	43.01	0.02	5/21/2014	S	30	40	-21.97	-31.97	37.943630	-122.385246
685C	19.81	17.34	2.47	68.00	70.47	70.61	-0.14	5/1/2014	S	62.5	65.5	-45.16	-48.16	37.955216	-122.381626
802A	31.77	29.93	1.84	38.50	40.34	43.65	-3.31	4/15/2014	S	9	39	20.93	-9.07	37.960659	-122.412430
803A	34.97	34.00	0.97	40.00	40.97	41.03	-0.06	5/27/2014	S	22	37	12.00	-3.00	37.960796	-122.411942
808A	63.67	60.50	3.17	57.00	60.17	58.48	1.69	4/15/2014	S	39	54	21.50	6.50	37.961048	-122.413536
CRC-MW3	10.39	10.80	-0.41	12.50	12.09	11.97	0.12	4/11/2014	H	2.5	12	8.30	-1.20	37.931932	-122.386594
CRC-MW4	11.42	12.00	-0.58	10.50	9.92	9.83	0.09	4/11/2014	H	2.5	10	9.50	2.00	37.930701	-122.386594
G1C-1	11.23	8.10	3.13	45.00	48.13	47.96	0.17	4/10/2014	S	25.5	44.5	-17.40	-36.40	37.937149	-122.379852
P114A	11.72	11.01	0.71	20.00	20.71	8.32	12.39	4/14/2014	S	NA	NA	NA	NA	37.938789	-122.386177
P116A	9.25	9.35	-0.10	20.00	19.90	19.59	0.31	6/3/2014	H	NA	NA	NA	NA	37.938732	-122.387505
P213A	16.77	17.15	-0.38	13.00	12.62	13.43	-0.81	4/14/2014	H	10.2	13	6.95	4.15	37.932823	-122.393082
P214A	11.54	12.20	-0.66	8.50	7.84	8.08	-0.24	4/11/2014	S	5.3	8.5	6.90	3.70	37.931366	-122.390793
P215A	10.89	12.20	-1.31	9.00	7.69	6.48	1.21	4/11/2014	S	6	9	6.20	3.20	37.930523	-122.389267
P215C	11.37	12.00	-0.63	26.50	25.87	25.99	-0.12	4/11/2014	S	16.5	26.5	-4.50	-14.50	37.930523	-122.389297
P216A	10.85	11.40	-0.55	6.00	5.45	5.49	-0.04	4/10/2014	H	3	6	8.40	5.40	37.929924	-122.386734
P216C	10.63	11.40	-0.77	25.00	24.23	25.16	-0.93	4/10/2014	S	15	25	-3.60	-13.60	37.929909	-122.386719
P218A	13.90	14.40	-0.50	7.00	6.50	6.09	0.41	4/14/2014	H	3	7	11.40	7.40	37.931623	-122.383635
P220A	10.89	11.16	-0.27	7.00	6.73	3.63	3.10	4/11/2014	S	3.5	7	7.66	4.16	37.937897	-122.378952
P221A	10.61	10.97	-0.36	6.50	6.14	6.35	-0.21	4/15/2014	H	2.5	6.5	8.47	4.47	37.934002	-122.392189
P280A	11.53	9.78	1.75	16.70	18.45	18.36	0.09	5/15/2014	S	1.2	16	8.58	-6.22	37.945316	-122.385735
P281A	11.21	10.50	0.71	10.70	11.41	11.41	0.00	5/15/2014	S	1	10.5	9.50	0.00	37.945332	-122.385635
P282A	11.24	9.74	1.50	16.50	18.00	17.44	0.56	5/16/2014	S	1.1	15.7	8.64	-5.96	37.944977	-122.385643
P283A	13.19	11.19	2.00	16.70	18.70	18.70	0.00	5/15/2014	S	1	16	10.19	-4.81	37.945038	-122.385536
P284A	10.31	8.81	1.50	16.20	17.70	17.70	0.00	5/29/2014	H	1	16	7.81	-7.19	37.944592	-122.385551
P285A	12.48	11.27	1.21	16.90	18.11	18.21	-0.10	5/16/2014	S	1.2	16.2	10.07	-4.93	37.944614	-122.385399
P301A	11.96	10.46	1.50	16.20	17.70	17.74	-0.04	5/15/2014	S	1	15.7	9.46	-5.24	37.944370	-122.385338
P302A	10.53	9.03	1.50	16.50	18.00	16.04	1.96	5/15/2014	S	1	15.7	8.03	-6.67	37.944340	-122.385468
P318A	10.54	8.30	2.24	4.50	6.74	6.73	0.01	4/10/2014	S	1.2	4.5	7.10	3.80	37.930832	-122.383575
P319A	10.48	10.90	-0.42	5.20	4.78	4.68	0.10	4/16/2014	S	1.2	5.2	9.70	5.70	37.934475	-122.384178
P319C	10.41	10.90	-0.49	30.00	29.51	28.72	0.79	4/16/2014	S	20	30	-9.10	-19.10	37.934494	-122.384178
P320A	7.51	7.80	-0.29	4.00	3.71	3.41	0.30	4/10/2014	H	1.5	4	6.30	3.80	37.932377	-122.381294
P321C	10.40	8.50	1.90	23.00	24.90	22.00	2.90	4/10/2014	S	12	23	-3.50	-14.50	37.929295	-122.383713
P322C	13.80	14.70	-0.90	28.50	27.60	27.56	0.04	4/11/2014	S	18.5	28.5	-3.80	-13.80	37.928738	-122.386375
P323C	11.07	12.00	-0.93	24.00	23.07	22.79	0.28	4/14/2014	S	14	24	-2.00	-12.00	37.929714	-122.385185
P324C	18.90	19.30	-0.40	40.00	39.60	39.48	0.12	4/11/2014	S	30	40	-10.70	-20.70	37.928978	-122.387466
P325A	8.96	9.80	-0.84	8.00	7.16	7.54	-0.38	4/11/2014	S	2	8	7.80	1.80	37.939655	-122.379272
P327A	10.07	10.50	-0.43	7.00	6.57	6.56	0.01	4/11/2014	H	1.2	7	9.30	3.50	37.939083	-122.378654
P327C	9.87	10.50	-0.63	22.50	21.87	21.59	0.28	4/11/2014	S	12.5	22.5	-2.00	-12.00	37.939083	-122.378632
P333A	13.16	11.36	1.80	13.00	14.80	15.13	-0.33	4/16/2014	H	2.5	12.5	8.86	-1.14	37.943089	-122.378090
P383A	11.61	8.97	2.64	12.00	14.64	14.26	0.38	5/19/2014	S	2	12	6.97	-3.03	37.942818	-122.385071
P384A	11.28	8.50	2.78	12.00	14.78	14.86	-0.08	5/29/2014	H	2	12	6.50	-3.50	37.943291	-122.385216
P385A	10.36	8.53	1.83	11.00	12.83	12.83	0.00	5/19/2014	S	2	11	6.53	-2.47	37.943802	-122.385315
P386A	10.13	10.82	-0.69	16.00	15.31	15.25	0.06	5/16/2014	S	2.5	16	8.32	-5.18	37.945740	-122.385590
P409A	9.39	9.78	-0.39	7.00	6.61	6.76	-0.15	4/11/2014	H	2	6.5	7.78	3.28	37.937473	-122.381012
P412A	8.85	9.41	-0.56	6.50	5.94	5.49	0.45	4/10/2014	H	2	6	7.41	3.41	37.938206	-122.376381
P413A	10.16	10.65	-0.49	7.00	6.51	5.61	0.90	4/11/2014	S	2	6.5	8.65	4.15	37.939911	-122.377075
P416A	11.99	8.66	3.33	5.50	8.83	8.03	0.80	4/11/2014	H	2	5	6.66	3.66	37.940952	-122.376556
P433A	10.74	9.19	1.55	10.00	11.55	12.44	-0.89	4/16/2014	H	2.5	9.7	6.69	-0.51	37.947014	-122.377518
P434A	8.66	9.39	-0.73	8.50	7.77	7.16	0.61	5/16/2014	S	3	8	6.39	1.39	37.946159	-122.381493
P435A	7.89	8.46	-0.57	17.00	16.43	15.48	0.95	4/16/2014	H	3	15.7	5.46	-7.24	37.946182	-122.380775
P436A	9.61	7.70	1.91	13.50	15.41	15.24	0.17	4/16/2014	H	2.5	12.5	5.20	-4.80	37.946632	-122.380478
P437A	8.45	8.08	0.37	17.00	17.37	18.24	-0.87	4/16/2014	S	3	16.7	5.08	-8.62	37.947182	-122.380524
P438A	15.15	12.43	2.72	15.00	17.72	17.63	0.09	5/28/2014	H	2.5	14.5	9.93	-2.07	37.947258	-122.378975
P439A	10.87	9.79	1.08	11.50	12.58	13.91	-1.33	5/28/2014	H	2.5	11	7.29	-1.21	37.947308	-122.378914
P440A	11.00	8.28	2.72	13.00	15.72	15.75	-0.03	4/16/2014	H	2.5	12.5	5.78	-4.22	37.947422	-122.378784
P441A	10.83	8.70	2.13	9.00	11.13	11.62	-0.49	4/16/2014	H	2.5	8.7	6.20	0.00	37.946476	-122.376358
P442A	11.13	11.45	-0.32	11.00	10.68	12.91	-2.23	4/16/2014	H	3.5	10.7	7.95	0.75	37.945396	-122.376549
P443A	12.03	9.33	2.70	11.00	13.70	13.48	0.22	4/16/2014	H	2.5	10.7	6.83	-1.37	37.944351	-122.376503
P444A	13.22	11.87	1.35	16.50	17.85	19.18	-1.33	4/16/2014	S	5	16	6.87	-4.13	37.944168	-122.378052
P449A	12.64	10.59	2.05	17.00	19.05	16.86	2.19	5/5/2014	S	4.5	16	6.09	-5.41	37.954052	-122.404663
P450A	12.80	10.67	2.13	19.00	21.13	17.07	4.06	5/5/2014	S	4.5	18	6.17	-7.33	37.954014	-122.404312
P451A	9.57	9.93	-0.36	19.30	18.94	18.44	0.50	5/5/2014	S	5	19	4.93	-9.07	37.953983	-122.404655
P452A	13.84	11.79	2.05	19.00	21.05	20.68	0.37	5/6/2014	S	5	18	6.79	-6.21	37.953556	-122.403275
P453A	14.01	11.56	2.45	17.50	19.95	19.24	0.71	5/6/2014	S	5	16.5	6.56	-4.94	37.953415	-122.402969
P454A	8.38	8.80	-0.42	28.50	28.08	24.45	3.63	5/6/2014	S	3.5	28.5	5.30	-19.70	37.953243	-122.402710
P455A	13.34	10.69	2.65	25.50	28.15	36.74	-8.59	5/6/2014	S	5	24.5	5.69	-13.81	37.953224	-122.402557
P456A	12.54	10.57	1.97	28.00	29.97	26.89	3.08	5/6/2014	S	4.5	27	6.07	-16.43	37.953148	-122.402458
P457A	12.94	10.60	2.34	24.50	26.84	26.14	0.70	5/6/2014	S	4	23	6.60	-12.40	37.953026	-122.402252
P458A	12.14	10.28	1.86	26.00	27.86	27.55	0.31	5/6/2014	S	5	24.5	5.28	-14.22	37.953026	-122.402199
P459A	12.65	10.29	2.36	21.00	23.36	22.37	0.99	5/6/2014	S	3	20	7.29	-9.71	37.952896	-122.402054
P460A	12.77	10.45	2.32	16.00	18.32	17.73	0.59	5/6/2014	H	3	15	7.45	-4.55	37.952755	-122.401779
P461A	13.30	10.71	2.59	19.00	21.59	21.23	0.36	5/6/2014	H	3	18	7.71	-7.29	37.952522	-122.401451
P462A	8.33	8.80	-0.47	18.50	18.03	12.79	5.24	5/7/2014	S	3	17.5	5.80	-8.70	37.952213	-122.401390
P463A	7.41	8.36	-0.95	14.50	13.55	10.36	3.19	5/7/2014	S	3	13.5	5.36	-5.14	37.952011	-122.401138
P464A	12.09	10.13	1.96	18.00	19.96	19.82	0.14	6/3/2014	S	3	17	7.13	-6.87	37.951939	-122.400742
P465A	20.13	19.00	1.13	24.30	25.43	27.59	-2.16	5/6/2014	S	14	24	5.00	-5.00	37.953548	-122.403999
P466A	10.12	8.56	1.56	18.30	19.86	19.97	-0.11	5/6/2014	H	6	18	2.56	-9.44	37.953419	-122.403610
P467A	14.25	12.72	1.53	19.80	21.33	21.60	-0.27	5/6/2014	H	4.5	19.5	8.22	-6.78	37.953693	-122.404358
P468A	11.71	9.97	1.74	17.80	19.54	18.73	0.81	5/6/2014	S	4.5	17.5	5.47	-7.53	37.953518	-122.404549
P469A	8.52	9.50	-0.98	17.80	16.82	16.91	-0.09	5/6/2014	S	4.5	17.5	5.00	-8.00	37.953209	-122.403885
P471A	8.42	9.17	-0.75	15.50	14.75	15.39	-0.64	5/29/2014	H	2	14.7	7.17	-5.53	37.952106	-122.400139
P472A	11.24	11.38	-0.14	24.50	24.36	22.00	2.36	6/3/2014	S	3	23.7	8.38	-12.32	37.952595	-122.399368
P473A	11.18	11.85	-0.67	30.50	29.83	26.58	3.25	5/29/2014	S	3	29.7	8.85	-17.85	37.952816	-122.399063
P474A	11.41	11.20	0.21	25.50	25.71	17.74	7.97	5/29/2014	S	3	24.7	8.20	-13.50	37.952820	-122.399155
P475A	9.96	10.65	-0.69	27.50	26.81	18.49	8.32	5/29/2014	S	3	26.7	7.65	-16.05	37.952969	-122.398926
P476A	9.36	10.22	-0.86	14.50	13.64	13.24	0.40	5/29/2014	S	3	13.7	7.22	-3.48	37.953087	-122.398819
P477A	9.71	10.56	-0.85	22.50	21.65	18.67	2.98	5/29/2014	S	3	21.7	7.56	-11.14	37.953030	-122.398735
P478A	9.08	9.91	-0.83	26.50	25.67	24.42	1.25	5/29/2014	S	3	25.7	6.91	-15.79	37.952961	-122.398544
P479A	9.20	9.89	-0.69	22.50	21.81	20.93	0.88	5/29/2014	S	3	21.7	6.89	-11.81	37.952881	-122.398354
P481A	9.15	10.11	-0.96	15.50	14.54	3.14	11.40	6/11/2014	S	3	14.7	7.11	-4.59	37.952793	-122.398132
P482A	9.04	10.27	-1.23	7.50	6.27	2.24	4.03	6/3/2014	S	2.5	6.7	7.77	3.57	37.952724	-122.397896

Table 1
Refinery Well Construction Information
Chevron Richmond Refinery

Well ID	Top of Casing Elevation (RRD)	Ground Surface Elevation (RRD)	Difference Between GS and TOC (feet)	Well Depth (from GS) (feet)	Constructed Well Depth (from TOC) (feet)	Measured Well Depth (from TOC) (feet)	Difference in Well Depth Values	Date of Measurement	Hard or Soft Bottom?	Depth to Top of Screen (from GS) (feet)	Depth to Bottom of Screen (from GS) (feet)	Top of Screen Elevation (RRD)	Bottom of Screen Elevation (RRD)	Latitude (Decimal)	Longitude (Decimal)
P483A	9.37	10.29	-0.92	7.50	6.58	5.88	0.70	6/3/2014	S	2.5	6.7	7.79	3.59	37.952766	-122.397881
P484A	9.45	10.61	-1.16	7.50	6.34	1.17	5.17	6/11/2014	H	2.5	6.7	8.11	3.91	37.952721	-122.397636
P485A	8.86	9.94	-1.08	17.00	15.92	NM	NA	6/5/2014	NA	3	16.2	6.94	-6.26	37.952705	-122.397415
P486A	8.85	9.96	-1.11	16.50	15.39	11.78	3.61	5/30/2014	S	3	15.7	6.96	-5.74	37.952747	-122.397408
P487A	8.69	9.89	-1.20	9.50	8.30	4.75	3.55	5/30/2014	S	2.5	8.7	7.39	1.19	37.952541	-122.397232
P489A	8.54	9.63	-1.09	17.00	15.91	15.46	0.45	6/3/2014	S	3	16.2	6.63	-6.57	37.952286	-122.396927
P490A	8.89	9.83	-0.94	14.50	13.56	NM	NA	6/2/2014	NA	3	13.7	6.83	-3.87	37.952206	-122.396912
P491A	9.89	10.58	-0.69	19.50	18.81	14.54	4.27	6/2/2014	S	3	18.7	7.58	-8.12	37.951962	-122.396530
P492A	11.43	12.02	-0.59	21.50	20.91	18.64	2.27	6/2/2014	S	3	20.7	9.02	-8.68	37.951759	-122.396164
P493A	10.73	11.59	-0.86	15.50	14.64	12.47	2.17	6/2/2014	S	3	14.7	8.59	-3.11	37.951591	-122.395981
P495A	9.95	10.53	-0.58	6.00	5.42	4.99	0.43	4/14/2014	H	2	5.5	8.53	5.03	37.932934	-122.382637
P496A	8.93	9.55	-0.62	6.00	5.38	4.76	0.62	4/14/2014	H	2	5.5	7.55	4.05	37.933792	-122.382088
P498A	10.90	11.13	-0.23	8.00	7.77	8.63	-0.86	4/10/2014	S	2.5	7.5	8.63	3.63	37.934238	-122.381310
P508A	13.80	10.84	2.96	13.00	15.96	14.74	1.22	4/29/2014	S	3.5	12.5	7.34	-1.66	37.953911	-122.380424
P509A	10.58	7.17	3.41	8.50	11.91	11.48	0.43	4/28/2014	H	2	8	5.17	-0.83	37.954037	-122.379700
P510A	17.05	17.19	-0.14	17.50	17.36	16.67	0.69	4/29/2014	S	3.5	17	13.69	0.19	37.953800	-122.379707
P511A	11.44	10.63	0.81	11.50	12.31	14.47	-2.16	4/28/2014	H	2.5	11	8.13	-0.37	37.954037	-122.378220
P514A	14.39	11.39	3.00	15.00	18.00	12.71	5.29	4/29/2014	H	3	13	8.39	-1.61	37.953793	-122.377647
P530AT	14.84	15.31	-0.47	13.00	12.53	12.72	-0.19	4/17/2014	H	4	13	11.31	2.31	37.931652	-122.400284
P531AT	14.74	15.26	-0.52	17.00	16.48	16.60	-0.12	4/17/2014	S	5	17	10.26	-1.74	37.931648	-122.400375
P532AT	13.50	13.98	-0.48	16.00	15.52	15.51	0.01	4/25/2014	S	6	16	7.98	-2.02	37.931351	-122.400139
P533AT	13.81	14.23	-0.42	16.00	15.58	14.37	1.21	4/25/2014	S	6	16	8.23	-1.77	37.931416	-122.400162
P537A	7.03	7.55	-0.52	4.00	3.48	3.67	-0.19	4/10/2014	H	1.5	4	6.05	3.55	37.929764	-122.383156
P538A	7.32	7.64	-0.32	4.50	4.18	3.89	0.29	4/10/2014	S	1.7	4.5	5.94	3.14	37.930405	-122.382698
P539A	7.23	7.64	-0.41	4.50	4.09	3.57	0.52	4/10/2014	S	1.6	4	6.04	3.64	37.931122	-122.382164
P540A	11.47	11.75	-0.28	4.00	3.72	4.05	-0.33	4/11/2014	S	1.5	4	10.25	7.75	37.928493	-122.382927
P543A	10.73	9.13	1.60	15.30	16.90	17.23	-0.33	5/6/2014	H	5	15	4.13	-5.87	37.953503	-122.403427
P544A	10.14	8.14	2.00	14.80	16.80	16.62	0.18	5/7/2014	H	4.5	14.5	3.64	-6.36	37.952438	-122.401566
P545A	9.20	9.56	-0.36	18.30	17.94	17.52	0.42	5/7/2014	S	4	18	5.56	-8.44	37.951920	-122.401222
P597A	12.45	10.04	2.41	10.00	12.41	12.48	-0.07	4/28/2014	H	2.5	10	7.54	0.04	37.952549	-122.381317
P598A	12.76	10.19	2.57	11.50	14.07	13.96	0.11	4/28/2014	H	2.5	11.5	7.69	-1.31	37.952778	-122.381645
P599A	12.55	9.92	2.63	10.00	12.63	9.09	3.54	4/28/2014	S	2.5	9.5	7.42	0.42	37.952930	-122.381859
P600A	9.10	6.50	2.60	9.50	12.10	12.03	0.07	4/28/2014	H	2.5	9	4.00	-2.50	37.953140	-122.381836
P601A	9.20	6.55	2.65	5.00	7.65	7.52	0.13	4/28/2014	H	2.5	4.5	4.05	2.05	37.953217	-122.381996
P602A	10.18	7.29	2.89	5.00	7.89	7.52	0.37	4/28/2014	H	2.5	4.5	4.79	2.79	37.953506	-122.381592
P603A	9.22	6.61	2.61	5.00	7.61	7.46	0.15	4/28/2014	H	2.5	4.5	4.11	2.11	37.953598	-122.381729
P605A	9.98	7.12	2.86	5.00	7.86	7.57	0.29	4/28/2014	H	2.5	4.5	4.62	2.62	37.953915	-122.381409
P606A	9.42	7.11	2.31	7.00	9.31	9.49	-0.18	4/28/2014	H	2.5	6.5	4.61	0.61	37.953873	-122.381065
P609A	8.98	9.16	-0.18	14.00	13.82	13.80	0.02	5/16/2014	H	4	14	5.16	-4.84	37.946060	-122.383049
P611A	11.42	11.66	-0.24	19.00	18.76	15.97	2.79	5/16/2014	S	5	19	6.66	-7.34	37.945995	-122.385345
P612A	13.00	10.13	2.87	14.00	16.87	17.20	-0.33	5/16/2014	S	4	14	6.13	-3.87	37.945858	-122.385353
P615A	10.43	10.90	-0.47	15.00	14.53	14.28	0.25	5/5/2014	S	4	16	6.90	-5.10	37.954079	-122.404823
P618A	10.02	10.60	-0.58	15.00	14.42	14.31	0.11	5/5/2014	S	3	15	7.60	-4.40	37.954033	-122.404778
P622A	9.64	10.24	-0.60	12.00	11.40	11.52	-0.12	4/14/2014	H	4	12	6.24	-1.76	37.931427	-122.384048
P623A	10.15	10.62	-0.47	12.00	11.53	11.61	-0.08	4/14/2014	H	4	12	6.62	-1.38	37.931858	-122.383728
P626A	14.74	12.93	1.81	16.00	17.81	19.12	-1.31	5/28/2014	H	6	16	6.93	-3.07	37.942806	-122.379112
P629A	10.20	10.90	-0.70	12.00	11.30	8.91	2.39	5/29/2014	S	4	12	6.90	-1.10	37.952316	-122.399750
P630A	11.16	7.46	3.70	7.50	11.20	11.75	-0.55	4/29/2014	H	2	7.5	5.46	-0.04	37.954033	-122.379265
P631A	9.89	10.63	-0.74	9.50	8.76	8.85	-0.09	4/29/2014	H	3	9.5	7.63	1.13	37.953922	-122.378891
P632A	11.38	11.88	-0.50	10.00	9.50	9.38	0.12	4/29/2014	H	3	10	8.88	1.88	37.953785	-122.378433
P633A	10.21	10.75	-0.54	9.50	8.96	8.91	0.05	4/29/2014	H	3	9.5	7.75	1.25	37.953915	-122.378143
P665A	9.91	10.05	-0.14	9.50	9.36	9.34	0.02	4/14/2014	S	NA	NA	NA	NA	37.935310	-122.381218
P666A	13.72	11.27	2.45	8.50	10.95	10.39	0.56	4/10/2014	H	NA	NA	NA	NA	37.933556	-122.380928
P681C	7.33	7.72	-0.39	43.00	42.61	43.34	-0.73	4/23/2014	S	NA	NA	NA	NA	37.947468	-122.386627
P682C	7.87	8.09	-0.22	52.00	51.78	52.69	-0.91	4/23/2014	S	NA	NA	NA	NA	37.949547	-122.387306
P683C	10.52	10.81	-0.29	56.50	56.21	54.92	1.29	4/29/2014	S	50	55	-39.19	-44.19	37.948205	-122.388447
P684C	10.11	10.41	-0.30	57.50	57.20	53.31	3.89	4/30/2014	S	45	55	-34.59	-44.59	37.951112	-122.389386
P686A	13.59	10.63	2.96	25.00	27.96	27.94	0.02	5/27/2014	S	10	25	0.63	-14.37	37.962094	-122.412651
P687A	12.95	9.90	3.05	25.00	28.05	27.81	0.24	5/27/2014	S	10	25	-0.10	-15.10	37.961571	-122.412223
P688A	10.90	11.36	-0.46	25.00	24.54	24.38	0.16	5/27/2014	S	10	25	1.36	-13.64	37.961493	-122.412153
RW001A	14.24	12.56	1.68	17.50	19.18	16.80	2.38	5/15/2014	S	2.5	14.5	10.06	-1.94	37.952976	-122.404922
RW002A	12.17	11.43	0.74	13.00	13.74	12.98	0.76	6/3/2014	S	3	13	8.43	-1.57	37.951706	-122.396843
RW003A	12.05	11.88	0.17	13.00	13.17	12.94	0.23	6/3/2014	S	3	13	8.88	-1.12	37.951515	-122.396736
RW004A	12.09	11.72	0.37	13.00	13.37	13.51	-0.14	6/3/2014	S	3	13	8.72	-1.28	37.951347	-122.396416
RW005A	13.89	12.62	1.27	12.50	13.77	13.39	0.38	5/15/2014	S	2.5	12.5	10.12	0.12	37.952976	-122.404915
RW006A	9.33	9.17	0.16	14.00	14.16	20.69	-6.53	5/5/2014	S	4	14	5.17	-4.83	37.953163	-122.404366
RW007A	14.17	15.16	-0.99	20.00	19.01	NM	NA	6/5/2014	NA	3	17	12.16	-1.84	37.948952	-122.399895
RW225A	13.48	7.38	6.10	NA	NA	14.95	NA	6/3/2014	S	NA	NA	NA	NA	NA	NA
RW366F	129.39	130.37	-0.98	109.20	108.22	104.12	4.10	4/23/2014	S	79	109.2	51.37	21.17	37.934151	-122.399635
RW432F	198.11	198.52	-0.41	173.00	172.59	177.48	-4.89	4/28/2014	S	138	168	60.52	30.52	37.934746	-122.399490
RW534AT	47.10	47.56	-0.46	32.00	31.54	19.54	12.00	3/23/2015	S	7	32	40.56	15.56	37.932455	-122.400834
RW573F	133.67	134.10	-0.43	105.00	104.57	94.17	10.40	4/23/2014	S	64.5	104.5	69.60	29.60	37.934078	-122.399117
RW574F	131.05	131.73	-0.68	107.50	106.82	105.41	1.41	4/23/2014	S	64.5	104.5	67.23	27.23	37.934357	-122.399475
RW575F	199.53	200.39	-0.86	177.00	176.14	168.14	8.00	4/28/2014	S	145.5	175.5	54.89	24.89	37.934696	-122.399384
RW619AT	50.07	49.50	0.57	25.00	25.57	25.66	-0.09	3/23/2015	H	10.7	24.7	38.80	24.80	37.932552	-122.401035
RW620AT	45.98	46.70	-0.72	40.00	39.28	37.85	1.43	4/17/2014	S	15	40	31.70	6.70	37.932396	-122.400696
RW81021	15.76	NA	NA	19.00	NA	5.89	NA	6/4/2014	S	8.5	18	NA	NA	37.952140	-122.403912
RW81022	13.55	NA	NA	14.00	NA	15.47	NA	5/6/2014	H	4.5	13.5	NA	NA	37.952852	-122.404000
RW81023	20.83	NA	NA	20.00	NA	20.45	NA	6/4/2014	S	10	19	NA	NA	37.952562	-122.404711
RW81026	18.79	NA	NA	20.50	NA	20.38	NA	6/4/2014	H	9.5	19	NA	NA	37.952514	-122.405005
RW82007	8.86	10.03	-1.17	12.00	10.83	10.32	0.51	6/4/2014	S	4.8	11.5	5.23	-1.47	37.952736	-122.398015
RW82010	9.14	10.11	-0.97	21.00	20.03	NM	NA	6/4/2014	NA	4.8	20.5	5.31	-10.39	37.952632	-122.397309
RW82012	9.22	10.14	-0.92	17.00	16.08	9.00	7.08	6/4/2014	S	4.8	16.5	5.34	-6.36	37.952262	-122.396999
RW84024	11.35	11.12	0.23	11.40	11.63	9.39	2.24	6/9/2014	H	2.7	7.3	8.42	3.82	37.953795	-122.377579
RW84029	15.50	14.60	0.90	21.00	21.90	21.64	0.26	4/29/2014	S	3	21	11.60	-6.40	37.953885	-122.380595

Notes:
NA = No data available
GS = Ground surface
TOC = Top of casing
NM = Not measured (well not found or accessible)
RRD = Richmond Refinery Datum (-2.2 feet mean sea level)

Appendix A:
Annual and Biennial Inspection Checklists

Richmond Refinery Monitoring Well Inspection and Maintenance Program
Well Inspection Checklist (Annual Inspection)
Inspection Number: _____

WELL INFORMATION

Well Number: _____ **Length of Screen (ft)** _____
Sector: _____ **Well Depth (ft. below TOC)** _____

PRIMARY INSPECTION ITEMS

INNER WELL CASING: ☐ STAINLESS STEEL ☐ PVC	**NO**	**YES**	**N/A**
1. Is the inner or outer well casing, corroded, bent, dented, cracked, or broken?	☐	☐	☐
2. Has either well casing sustained vehicular damage?	☐	☐	☐
3. If warranted, is a weep located a the base of the outer protective casing?	☐	☐	☐
4. Is the inner or outer well casing loose (annular seal broken)?	☐	☐	☐
5. If flush-mounted, is the traffic cover, christy box or annular seal damaged or excessivley rusted?	☐	☐	☐
6. If flush-mounted, is the rubber gasket seal in good condition?	☐	☐	☐
7. If flush-mounted, is water collecting inside the christy box?	☐	☐	☐
WELL SECURITY:			
8. Does the outermost well casing have a lockable cap or lid?	☐	☐	☐
9. Does this cap fit snuggly over the inside of the casing and can not be removed when locked?	☐	☐	☐
10. Is there a waterproof steel/brass lock present?	☐	☐	☐
11. Where applicable, are the hasps attached firmly to the well cap and/or metal casing?	☐	☐	☐
12. If flush-mounted, is the traffic cover securely bolted to the christy box?	☐	☐	☐
13. If flush-mounted, is there a water tight cap, does it seal and is it securely locked?	☐	☐	☐
WELL IDENTIFICATION:			
14. Is the well number legible on the well?	☐	☐	☐
15. Is the well identification number correct (verify against map)?	☐	☐	☐
DOWN-HOLE CONDITION:			
16. Is dedicated sampling equipment present in well?	☐	☐	☐
17. Is a reference point marked on the top of the casing (TOC)?	☐	☐	☐

SECONDARY INSPECTION ITEMS

WELL ACCESS:			
18. Does the access road require re-grading or additional gravel?	☐	☐	☐
19. Does the access road or trail require weedeating?	☐	☐	☐
20. Do any restrictions (locked gates, fallen trees, construction) preclude access to well?	☐	☐	☐

Explain: _____

CONCRETE PAD:			
21. Is a concrete pad installed (active wells only)?	☐	☐	☐
22. Is the pad cracked or deteriorated?	☐	☐	☐
23. Does the pad slope away from the casing or christy box to prevent water from ponding?	☐	☐	☐
PROTECTIVE POSTS:			
24. Are the protective posts present?	☐	☐	☐
25. Are the protective posts damaged?	☐	☐	☐
26. Are the protective posts positioned to prevent collision damaged to well (<6ft apart)?	☐	☐	☐
27. Are the protective posts of adequate height (3ft)?	☐	☐	☐
28. Is the high traffic yellow paint degraded?	☐	☐	☐

COMMENTS

Inspection Date: Inspected By:

Richmond Refinery Monitoring Well Inspection and Maintenance Program
Well Inspection Checklist (Biennial Inspection)
Inspection Number: _____

WELL INFORMATION

Well Number: _____ **Length of Screen (ft.)** _____

Sector: _____ **Well Depth (ft. below TOC)** _____

PRIMARY INSPECTION ITEMS

INNER WELL CASING: ☐ STAINLESS STEEL ☐ PVC	**NO**	**YES**	**N/A**
1. Is the inner or outer well casing corroded, bent, dented, cracked, or broken?	☐	☐	☐
2. Has either well casing sustained vehicular damage?	☐	☐	☐
3. If warranted, is a weep located at the base of the outer protective casing?	☐	☐	☐
4. Is the inner or outer well casing loose (annular seal broken)?	☐	☐	☐
5. If flush-mounted, is the traffic cover, christy box or annular seal damaged or excessively rusted?	☐	☐	☐
6. If flush-mounted, is the rubber gasket seal in good condition?	☐	☐	☐
7. If flushed-mounted, is water collecting inside the christy box?	☐	☐	☐
WELL SECURITY:			
8. Does the outermost well casing have a lockable cap or lid?	☐	☐	☐
9. Does this cap fit snuggly over the inside of the casing and can not be removed when locked?	☐	☐	☐
10. Is there a waterproof steel/brass lock present?	☐	☐	☐
11. Where applicable, are the hasps attached firmly to the well cap and/or metal casing?	☐	☐	☐
12. If flush mounted, is the traffic cover securely bolted to the christy box?	☐	☐	☐
13. If flush mounted, is there a water tight cap, does it seal and is it securely locked?	☐	☐	☐
WELL IDENTIFICATION:			
14. Is the well number legible on the well?	☐	☐	☐
15. Is the well identification number correct (verify against map)?	☐	☐	☐
DOWN-HOLE CONDITION:			
16. Is dedicated sampling equipment present in well?	☐	☐	☐
17. Is a reference point marked on the top of the casing (TOC)?	☐	☐	☐
18. Measured depth of well from TOC		_____ft.	
19. Calculate: Well Depth - Measured depth (corrected to TOC) / Screen Length		_____	
20. Is this value > 0.2 (20% of screen or open-hole interval filled with sediment?	☐	☐	☐
21. Do any obstructions occur within the well?	☐	☐	☐
22. Is the bottom of the well (depth measurement) soft (i.e. mud on the tag line)?	☐	☐	☐

SECONDARY INSPECTION ITEMS

WELL ACCESS:			
23. Does the access road require re-grading or additional gravel?	☐	☐	☐
24. Does the access road or trail require weedeating?	☐	☐	☐
25. Do any restrictions (locked gates, fallen trees, construction) preclude access to well?	☐	☐	☐

Explain: _____

CONCRETE PAD:			
26. Is a concrete pad installed?	☐	☐	☐
27. Is the pad cracked or deteriorated?	☐	☐	☐
28. Does the pad slope away from the casing or christy box to prevent water from ponding?	☐	☐	☐
PROTECTIVE POSTS:			
29. Are the protective posts present?	☐	☐	☐
30. Are the protective post damaged?	☐	☐	☐
31. Are the protective posts positioned to prevent collision damaged to well (<6ft apart)?	☐	☐	☐
32. Are the protective posts of adequate height (3ft)?	☐	☐	☐
33. Is the high traffic yellow paint degraded?	☐	☐	☐

COMMENTS

Inspection Date: Inspected By:

Appendix B:
Well Maintenance and Abandonment Request Forms

Richmond Refinery
Monitoring Well Maintenance Request
WMR Number:_____

WELL NUMBER:	LOCATION:
WELL INSPECTION DATE:	INSPECTED BY:

MAINTENACE WORK REQUESTED:

- ☐ Build/Repair Concrete Pad
- ☐ Install/Paint Protective Posts
- ☐ Repair/Replace Hasp
- ☐ Remove/Replace Lock
- ☐ Well Re-development
- ☐ Repair/Replace Christy Box
- ☐ Replace gasket seals or bolts on Traffic Cover
- ☐ Replace Well Cap or Lid
- ☐ Extend or Repair Well Casing
- ☐ Replace/Repaint Well Identification
- ☐ Well Access (weedeating, mowing, re-grading)
- ☐ Other

DESCRIPTION OF WORK:

DATE WMR SUBMITTED:	WMR SUBMITTED TO:

MAINTENANCE PERFORMED BY: (name)
DATE WORK COMPLETED:
COMMENTS ON MAINTENANCE WORK PERFORMED:

WORK INSPECTED BY:	DATE INSPECTED:

INSPECTION COMMENTS:

APPROVED BY: DATE:

Richmond Refinery
Monitoring Well Abandonment Request
Request Number:_____

WELL NUMBER:	SITE:
INSPECTION NUMER:	INSPECTED BY:

REASON FOR ABANDONMENT:

- ☐ Well Casing Damage/Deterioration
- ☐ Annular Grout Deterioration
- ☐ Loss of Well Security
- ☐ Downhole Conditions
- ☐ Site Construction, Closure, or Operation

COMMENTS/EXPLANATION FOR ABANDONMENT REQUEST:

REQUEST SUBMITTED BY:	DATE SUBMITTED:
CONTRACTOR PERFORMING ABANDONMENT ACTIVITIES:	DATE COMPLETED:

DOCUMENTATION ATTACHED: Y ☐
N ☐

APPROVED BY: _____ DATE: _____
(PROGRAM MANAGER OR DESIGNEE)