

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

MONITORING AND REPORTING ORDER NO. R5-2012-0814

CALIFORNIA WATER CODE SECTION 13267

FOR  
SPX CORPORATION  
SPX MARLEY COOLING TECHNOLOGIES STOCKTON FACILITY  
GROUNDWATER REMEDIATION  
SAN JOAQUIN COUNTY

This monitoring and reporting program (MRP) is issued by the Executive Officer of the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) pursuant to California Water Code Section 13267. This MRP contains the minimum monitoring and reporting requirements necessary to determine compliance with Waste Discharge Requirements (WDR) Order No. R5-2007-0126. SPX Marley Cooling Technologies (hereafter "SPX"), a wholly owned subsidiary of SPX Corporation (hereafter collectively referred to as Discharger), submitted a letter requesting to revise the existing Monitoring and Reporting Program (MRP) No. R5-2007-0126, dated 13 September 2007, for full scale in-situ treatment of groundwater containing chromium at SPX's facility located at 200 North Wagner Avenue (Site) in Stockton, San Joaquin County (Figure 1 and Figure 2). This MRP addresses this request and also addresses the request to remove nitrates from the analytical suite.

The following MRP is designed to delineate and monitor the extent of chromium contaminated groundwater and to evaluate whether remediation efforts are effective. SPX maintains and operates a groundwater remedial well field and treatment system that has been operating since 1992. This system provides hydraulic control and treatment of chromium contaminated groundwater. A more aggressive remediation effort involving in-situ chemical treatment was implemented in 2008.

This MRP has groundwater monitoring elements for both remediation efforts - Groundwater Monitoring (affiliated with cleanup efforts associated with the remedial well field and treatment system) and Full-Scale in-situ Remediation Program (affiliated with the full-scale in-situ chemical treatment program).

The Discharger shall not implement any changes to this MRP unless and until a revised MRP is approved in writing by Executive Officer of the Central Valley Water Board.

## I. GROUNDWATER MONITORING

The Discharger has constructed and monitors 116 wells both within its property and on adjoining properties as shown in Attachment B of this MRP. These wells monitor groundwater in shallow, intermediate, and deep zones, as well as a 100-foot sand zone. Prior to the construction of any new groundwater monitoring or extraction wells, the Discharger shall submit plans and specifications to the Central Valley Water Board for review and approval. Once installed, all new wells shall be added to the monitoring program and shall be sampled and analyzed according to the schedule provided herein.

Summary of Shallow Zone conditions: the average hydraulic gradient in the shallow zone is 0.0023 ft/ft with an azimuth of 206 degrees based on groundwater elevations measured from 1985 to 2011. The highest recent<sup>1</sup> total chromium and hexavalent chromium concentrations were detected in shallow zone well EW-3 in the North Yard at 4,700 micrograms per liter ( $\mu\text{g/l}$ ) and 4,650  $\mu\text{g/l}$ , respectively. Chromium was detected at concentrations greater than the reporting limit (less than 10  $\mu\text{g/L}$ ) in wells EW-3, MW-8, MW-102, MW-105, MW-106 and MW-207 in the North Yard and in wells MW-201, MW-204 (S-8), MW-205 (S-7) and MW-301 in the South Yard<sup>1</sup>.

Summary of Intermediate Zone conditions: the average hydraulic gradient in the intermediate zone is 0.0024 ft/ft with an azimuth of 187 degrees based on groundwater elevations measured from 1985 to 2011. The highest recent<sup>1</sup> total and hexavalent chromium concentrations were detected at intermediate zone well MW-448D in the South Yard at 2,910  $\mu\text{g/l}$  and 2,800  $\mu\text{g/l}$ , respectively.

The Discharger currently operates 5 onsite extraction wells (these also serve as monitoring wells) and may install and operate additional extraction wells as necessary to capture chromium contaminated groundwater. Additional extraction and monitoring wells may be installed based on the results of the annual monitoring reports provided during ongoing remediation.

### A. Monitoring Wells and Sampling Schedule

Groundwater elevations shall be measured quarterly at all accessible monitoring and extraction wells except at the domestic, irrigation, and municipal water supply wells (i.e., Wells 5116D, Columbini No. 1 Domestic, Columbini No. 2 Domestic, Cuneo Domestic, Columbini No. 2 Irrigation, Columbini No. 3 Irrigation, CWS-20, CWS-35, CWS-52, and CWS-62). Documentation of measured groundwater levels shall follow the guidelines provided in ASTM D6089-97(2010) – *Standard Guide for Documenting a Groundwater Sampling Event*. Additionally, groundwater elevations shall be reported in feet above mean sea level, with depths to groundwater measured to the nearest 0.01 foot. The quarterly monitoring events shall occur during January, April, July and October of each year.

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<sup>1</sup> From the 2012 1<sup>st</sup> Quarter Groundwater Monitoring data, MWH, January 2012

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Groundwater sampling procedures shall follow ASTM D6452-99(2005) and USEPA "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers" guidelines. All monitoring wells shall be purged using either dedicated submersible pumps or a portable submersible pump. Water quality parameters to monitor during well purging include pH, electrical conductivity in units of micromhos per centimeter (umhos/cm), oxidation-reduction potential (ORP) in units of millivolts (mV), turbidity in NTUs, and temperature of the discharge water. Groundwater samples will be collected after the water quality parameters have stabilized per ASTM D6452-99(2005) and USEPA groundwater sampling guidelines. Solid and liquid wastes, principally water resulting from equipment decontamination, well development, formation water generated during drilling, and purge or sampling water, shall be collected and disposed of pursuant to applicable requirements.

All samples shall be representative of the volume and the nature of the discharge and matrix of the sampled medium. The time, date, and location of each sample shall be recorded on the sample chain of custody form.

Groundwater samples shall be collected from select wells on a semiannual, annual, or biennial basis. Groundwater samples collected semiannually shall be collected during the April and October monitoring events. Groundwater samples collected annually shall be collected during the April monitoring event. Groundwater samples collected biennially shall be collected every other April.

The following wells shall be sampled semiannually:

EW-1, I-11, MW-2, MW-104 (S-2), MW-204 (S-8), MW-205 (S-7), MW-213 (I-7), MW-214 (I-8), MW-301, MW-303, MW-321 (I-9), MW-324 (I-10), MW-363 (D-1), MW-424 (I-2), MW-427 (I-3), MW-436 (I-5), MW-461 (D-2), S-6, S-9, 5116D, Col. No. 1, Col. No. 2, Cuneo, Col. No. 3, CWS-20, CWS-35, CWS-52, and CWS-62. In addition, any new monitoring wells installed shall be monitored semiannually for two years after installation. After two years, the frequency of sampling will be evaluated to determine if the well may be sampled semi-annually, annually or biennially.

The following wells shall be sampled annually:

EW-2, EW-3, EW-4, EW-5, MW-4, MW-5, MW-6, MW-8, MW-9, MW-101, MW-102, MW-103, MW-105, MW-106, MW-107, MW-201, MW-206, MW-207, MW-208, MW-209, MW-212, MW-300, MW-304, MW-310, MW-320, MW-322, MW-325, MW-411, MW-429 (I-4), MW-439 (I-6), MW-445, MW-446, MW-447S, MW-447D, MW-448S, MW-448D, MW-465, TW-12, TW-13, TW-14, TW-15, TW-16, and TW-17.

The following wells shall be sampled biennially:

MT-1, MT-2, MT-3, MT-4, MT-5, MT-6, MT-7, MT-8, MT-9, MW-7, MW-202, MW-203, MW-211, MW-323, MW-326, MW-327, MW-328, MW-400, MW-401, MW-410, MW-412 (S-3), MW-421, MW-422, MW-423, MW-425, MW-426, MW-428, MW-431, MW-432, MW-433, MW-434, MW-435, MW-437, MW-438, MW-440, MW-442, MW-443, MW-464, MW-468, and S-4.

## B. Laboratory and Field Analysis

All groundwater samples from the above wells shall be analyzed pursuant to the following table:

Parameter	Method <sup>1</sup>	Unit	Practical Quantitation Limit <sup>2</sup>
Chromium (Dissolved Total)	EPA 6020	µg/l	10 µg/l
Electrical Conductivity	Field Meter	µmhos/cm	--
pH	Field Meter	pH units	--
Temperature	Field Meter	°Celsius	--
Extraction Rate <sup>3</sup>	Field Meter	GPM	--
Purge Rate <sup>4</sup>	Field Meter	GPM	--
Turbidity	Field Meter	NTU	--
Total Gallons Purged <sup>4</sup>	Field Meter	Gallons	--
Water Level	Field Meter	ft MSL	--

1. If necessary, equivalent analytical methods may be used with the concurrence of the Central Valley Water Board staff.
2. All concentrations between the Method Detection Limit and the Practical Quantitation Limits shall be reported, and reported as an estimated value.
3. This applies only to extraction wells.
4. This applies only to monitoring wells.

## II. GROUNDWATER MONITORING UPON INITIATION OF REDUCTANT SOLUTION INJECTION (FULL-SCALE IN-SITU TREATMENT)

The Remedial Action Plan<sup>2</sup> (RAP) for the SPX site proposed measures to achieve site-specific groundwater cleanup goals in a shorter time frame than the current extraction and treatment program. These measures include injecting reductant solution (a.k.a., groundwater amendment) along a grid configuration within the northern property using both shallow and deep injection intervals. To accomplish this, a full-scale in-situ treatment program was conducted from January to June 2008, with supplemental treatment in September and October 2010 that focused on groundwater in the Intermediate water-bearing zone. Data collected during 17 quarterly monitoring events (January 2008 through January 2012), and several supplemental sampling events, demonstrate that hexavalent chromium concentrations across large portions of the former groundwater plume have been reduced. This section requires more frequent groundwater monitoring to occur during amendment injection. The groundwater monitoring described in this section supersedes that described in Section I for those wells being used to monitor the in-situ groundwater treatment process.

### A. Groundwater Monitoring for Full-Scale In-situ Treatment - Wells and Sampling Schedule

Pursuant to the RAP, the existing monitoring well network is being used for monitoring the progress of the full-scale in-situ treatment.

Groundwater samples shall be collected and analyzed on a quarterly basis for four quarters following an injection event. Following four quarters of performance monitoring, sample frequencies will revert to those established in Section I. *Groundwater Monitoring*, based on sample results and concurrence from the Central Valley Water Board Project Manager. The Discharger and Central Valley Water Board Project Manager may mutually agree on a revised groundwater well sample list and/or frequency that is different from the Section I *Groundwater Monitoring* program, following the post injection four quarter sampling period (defined in this section), if such a deviation is determined to provide added value, understanding, and interpretation of the groundwater plume. Any such deviation would not consist of any more samples and/or frequency as established in Section II *Groundwater Monitoring Upon Initiation Of Reductant Solution Injection (Full-Scale In-Situ Treatment)* and any fewer samples and/or frequency as established in Section I *Groundwater Monitoring*.

Because of the limited areas of impact caused by amendment injection, there is no need to monitor the entire SPX site when injections are occurring only in part of the Site. For this reason, the SPX site has been divided into two amendment injection areas.

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<sup>2</sup> Final Remedial Action Plan Amendment, Former Marley Cooling Tower Company, Stockton, California, MWH, June 2007

When amendment injection is occurring north of the Stockton terminal and eastern rail spur, the following wells shall be sampled quarterly for the outlined parameters:

- 1) Dissolved chromium and field parameters:
  - a) Background/compliance wells: MW-7, MW-202, MW-210, MW-211, MW-302, and MW-401
  - b) General Wells: MW-1, and MW-361.
  
- 2) Section II, Part B, Laboratory and Field Analysis parameters:
  - a) EW-3, MW-2, MW-4, MW-6, MW-8, MW-101, MW-102, MW-104 (S-2), MW-105, MW-106, MW-206, MW-207, MW-208, MW-213 (I-7), MW-214 (I-8), MW-300, MW-320, MW-323, TW-12, TW-13 and any new monitoring wells installed north of the Stockton terminal and eastern rail spur.

When amendment injection is occurring south of the Stockton terminal and eastern rail spur, the following wells shall be sampled quarterly for the outlined parameters:

- 1) Dissolved chromium and field parameters:
  - a) Background/compliance wells: MW-201, MW-304, MW-310, and MW-325.
  
- 2) Section II, Part B, Laboratory and Field Analysis parameters:
  - a) EW-1, I-11, MW-9, MW-204 (S-8), MW-205 (S-7), MW-301, MW-303, MW-321 (I-9), MW-322, MW-324 (I-10), MW-447S, MW-447D, MW-448S, MW-448D, TW-14, TW-15, TW-16, TW-17 and any new monitoring wells installed south of the Stockton terminal and eastern rail spur.

## B. Groundwater Monitoring for Full-Scale In-situ Treatment - Laboratory and Field Analysis

All groundwater samples shall be grab samples. Samples from the wells used for groundwater monitoring during full-scale in-situ treatment shall be analyzed pursuant to the following table:

Parameter	Method <sup>1</sup>	Unit	Practical Quantitation Limit <sup>2</sup>
Hexavalent Chromium	EPA 7196A	µg/l	0.5 µg/l
Chromium (Dissolved Total)	EPA 6020	µg/l	10 µg/l
Arsenic	EPA 6020	µg/l	5 µg/l
Iron	EPA 6020	µg/l	50 µg/l
Manganese	EPA 6020	µg/l	10 µg/l
Sulfate	EPA 300.0	µg/l	1 mg/l
Total Dissolved Solids	EPA 160.1	mg/l	10 mg/l
Total Organic Carbon	EPA 415.1	mg/l	2 mg/l
Dissolved Oxygen	Field Meter	mg/l	--
Electrical Conductivity	Field Meter	Umhos/cm	--
Oxidation/Reduction Potential	Field Meter	Millivolts	--
pH	Field Meter	pH units	--
Water Level	Field Meter	ft MSL	

1. If necessary, equivalent analytical methods may be used with the concurrence of the Central Valley Water Board staff.
2. All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported, and reported as an estimated value.

## III. AMENDMENT DISCHARGE MONITORING

The Discharger shall monitor daily the discharge of water and amendments that are injected into the groundwater. This monitoring shall include, at a minimum, recording of injected water and amendment volumes in gallons per day, and monitoring of amendment(s) added and biocides added (if any) in kilograms per day. Each amendment addition shall be recorded individually, along with information regarding the time over which the amendment was injected into the aquifer.

#### IV. AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the following parameters:

Parameter	Method <sup>1</sup>	Practical Quantitation Limit <sup>2</sup>
Volatile Organic Compounds	EPA 8020 or 8260B	0.5 µg/L
Semi-volatile Organic Compounds	EPA 8270	5.0 µg/L
General Minerals <sup>3</sup>	Various	Various
Metals, Total & Dissolved <sup>4</sup>	EPA 200.7, 200.8, 7196A	Various
Total Dissolved Solids	EPA 160.1	10 mg/L
pH	Field Meter	NA
Electrical Conductivity	Field Meter	NA

<sup>1</sup> Discharger may use an equivalent method that achieves the maximum detection limit with the concurrence of the Central Valley Water Board staff.

<sup>2</sup> All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported, and reported as an estimated value.

<sup>3</sup> Alkalinity, bicarbonate, potassium, chloride, sulfate, total hardness, nitrate, nitrite, and ammonia.

<sup>4</sup> Metals include arsenic, barium, cadmium, calcium, total chromium, hexavalent chromium, copper, iron, lead, manganese, magnesium, mercury, molybdenum, nickel, selenium and silica.

The analysis shall be done on the pure amendment and on the mixture of the amendment and municipal supply or treated effluent water at the estimated concentration that would be injected during the full-scale in-situ treatment.

#### V. QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) shall be performed to ensure precision and accuracy for groundwater sampling activities. Minimum QA/QC requirements are as follows:

##### A. Duplicate Samples

One duplicate groundwater sample shall be collected for every ten primary groundwater samples collected during each groundwater monitoring event. At least one duplicate groundwater sample shall be collected from one of the domestic, irrigation, or CWS wells and analyzed for hexavalent chromium.



## B. Chain-of-Custody Forms

Completed chain-of-custody forms shall be provided with the final laboratory reports.

## C. Field Meters

Field testing instruments shall be used by an operator trained in proper use and maintenance of the instruments. All field instruments shall be calibrated prior to each monitoring event. In addition, field parameter instruments shall be serviced or calibrated by the manufacturer at the recommended frequency. Field calibration reports shall be included in the semi-annual groundwater monitoring reports.

## VI. REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., influent, effluent, groundwater, etc.), and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Central Valley Water Board.

Semi-annual electronic reports, which conform to the requirements of the California Code of Regulations, title 23, division 3, chapter 30, shall be submitted electronically over the internet to the State Water Board Geotracker database system by **1 August** and **1 February**, until such time as the Executive Officer determines that the reports are no longer necessary.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

### A. Semiannual Reports

Semiannual reports shall be submitted to the Board by the Discharger to monitor long-term groundwater trends and to assess long-term effects of injected substances on aquifer geochemistry until such time as the Executive Officer determines that the reports are no longer necessary. The first semiannual groundwater monitoring report for each year, which will include data collected in January and April, will be submitted to the Central Valley Water Board by **1 August**. This report shall include analytical results for groundwater samples collected on a quarterly, semiannual, annual, and biennial basis.

The second semiannual groundwater monitoring report for each year, which will include data collected in July and October, will be submitted to the Central Valley Water Board

by **1 February** of the following year. This report shall include analytical results for groundwater samples collected on a quarterly and semiannual basis.

Each semiannual report shall include the following minimum information:

1. Depths-to-water measurements and corresponding groundwater elevations for all monitoring wells and extraction wells, extraction rates and total volume extracted from each active extraction well, and groundwater analytical results for all wells sampled. This data shall be presented in tabular format;
2. Copies of all final laboratory analytical reports, including QA/QC (This data may be provided electronically on compact disk);
3. Field logs containing, at a minimum, water quality parameters measured before, during, and after well purging, method of purging, depth of water, volume of water purged, etc. (This data may be provided electronically on compact disk) ;
4. A calibration log verifying calibration of any field monitoring instrument (e.g., pH, temperature, electrical conductivity, and turbidity meters) used to measure parameters during well purging (This data may be provided electronically on compact disk);
5. Groundwater elevation contour and isoconcentration (hexavalent chromium) contour maps for the shallow, intermediate and, deep groundwater zones;
6. Estimated hydraulic gradients and average liner groundwater velocities for the shallow, intermediate and, deep groundwater zones in tabular format;
7. Water level and water quality hydrographs showing historical data for each well (This data may be provided electronically on compact disk);
8. Any proposed changes in the extraction well network with justification for the change.
9. If applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions.

## B. Annual Groundwater Evaluation Report

The July thru December semiannual groundwater monitoring report shall also serve as an annual groundwater evaluation report. This report shall include a summary of the groundwater quality beneath the site; a hydraulic capture analysis; an evaluation of cleanup progress; a discussion of any data gaps and potential deficiencies in the monitoring system; a review of the treatment system performance; and any recommendations to potentially accelerate site cleanup progress or any modifications to enhance cleanup. The annual evaluation report shall additionally contain the following minimum information:

1. A summary of treatment system operation and maintenance performed, including inspections, repairs, and equipment replacement (if applicable);
2. The reasons for and duration of all interruptions in the operation of the remedial well field and treatment system, and actions planned or taken to correct and prevent interruptions, if applicable;
3. A discussion of the long-term trends in the concentrations of chromium detected in the groundwater;
4. An evaluation of the performance of the groundwater treatment system, including a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the contaminants and whether the contaminant plume is being captured by the extraction system.
5. A discussion of compliance with the monthly waste discharge requirements;
6. A discussion of any data gaps, potential deficiencies/redundancies in the monitoring system or reporting program, and;
7. An analysis of groundwater geochemistry as a result of the injections of reductant solution to determine if the amendments and any byproducts are being adequately contained by the existing groundwater extraction system ;
8. If applicable, a proposal and rationale for any revisions to monitoring frequency or the list of analytes.
9. Any recommendations to enhance cleanup.

A letter transmitting each monitoring report (including self-monitoring reports) shall be provided. Such a letter shall include a discussion of any violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective

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actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

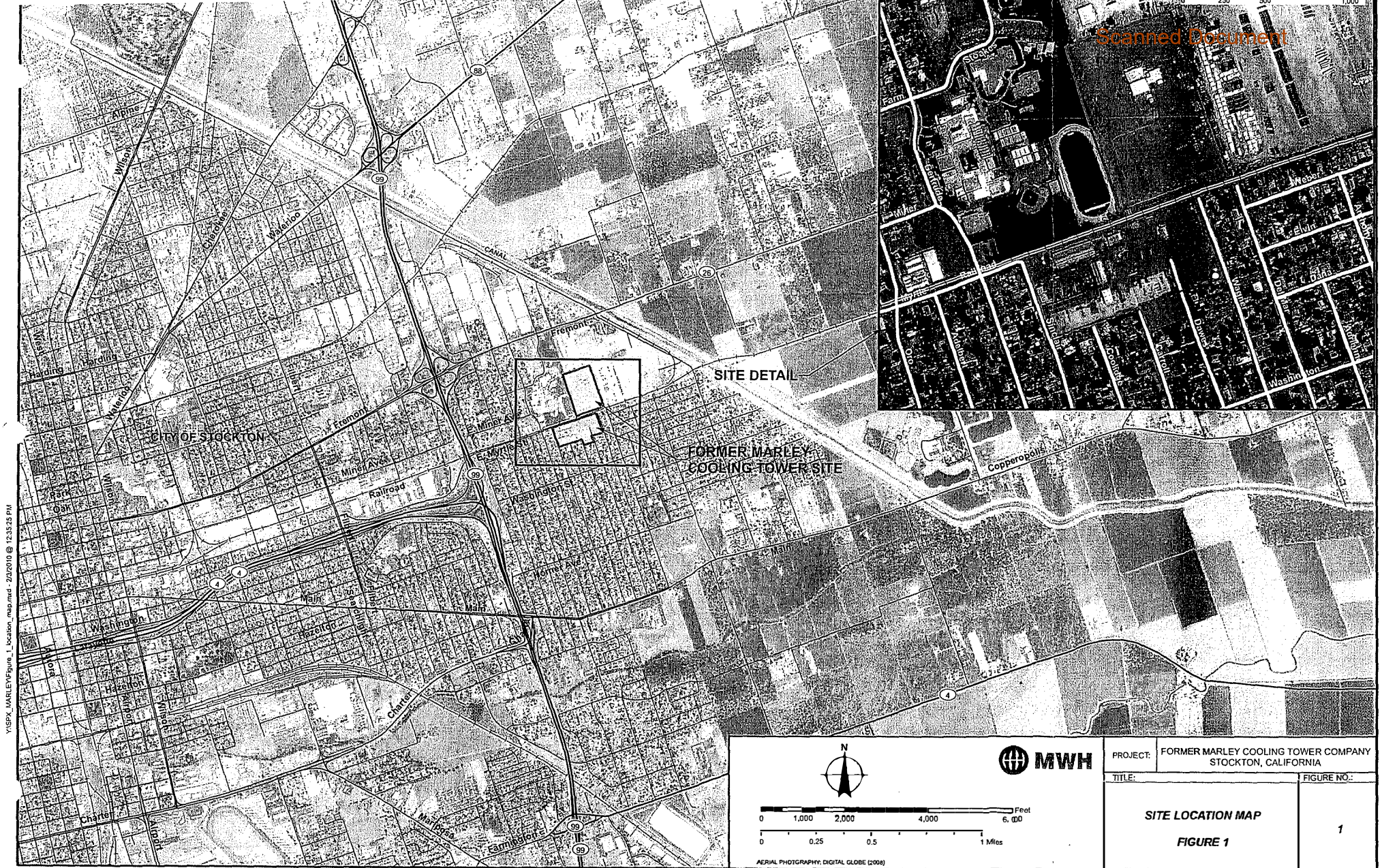
The results of any monitoring done more frequently than required at the locations specified in the MRP also shall be reported to the Board. The Discharger shall implement the above monitoring program on the first day of the month, following adoption of this order.

This Order is effective upon the date of signature.

Ordered by:

  
\_\_\_\_\_  
for PAMELA C. CREEDON, Executive Officer

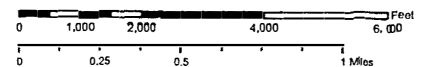
  
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Y:\SPX\_MARLEY\Figure 1 location map.mxd - 2/2/2010 @ 1:35:35 PM

SITE DETAIL

FORMER MARLEY COOLING TOWER SITE



AERIAL PHOTOGRAPHY: DIGITAL GLOBE (2008)

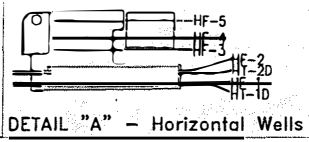
PROJECT:	FORMER MARLEY COOLING TOWER COMPANY STOCKTON, CALIFORNIA
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TITLE:	FIGURE NO.:
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<b>SITE LOCATION MAP</b>	<b>1</b>
<b>FIGURE 1</b>	

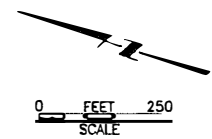
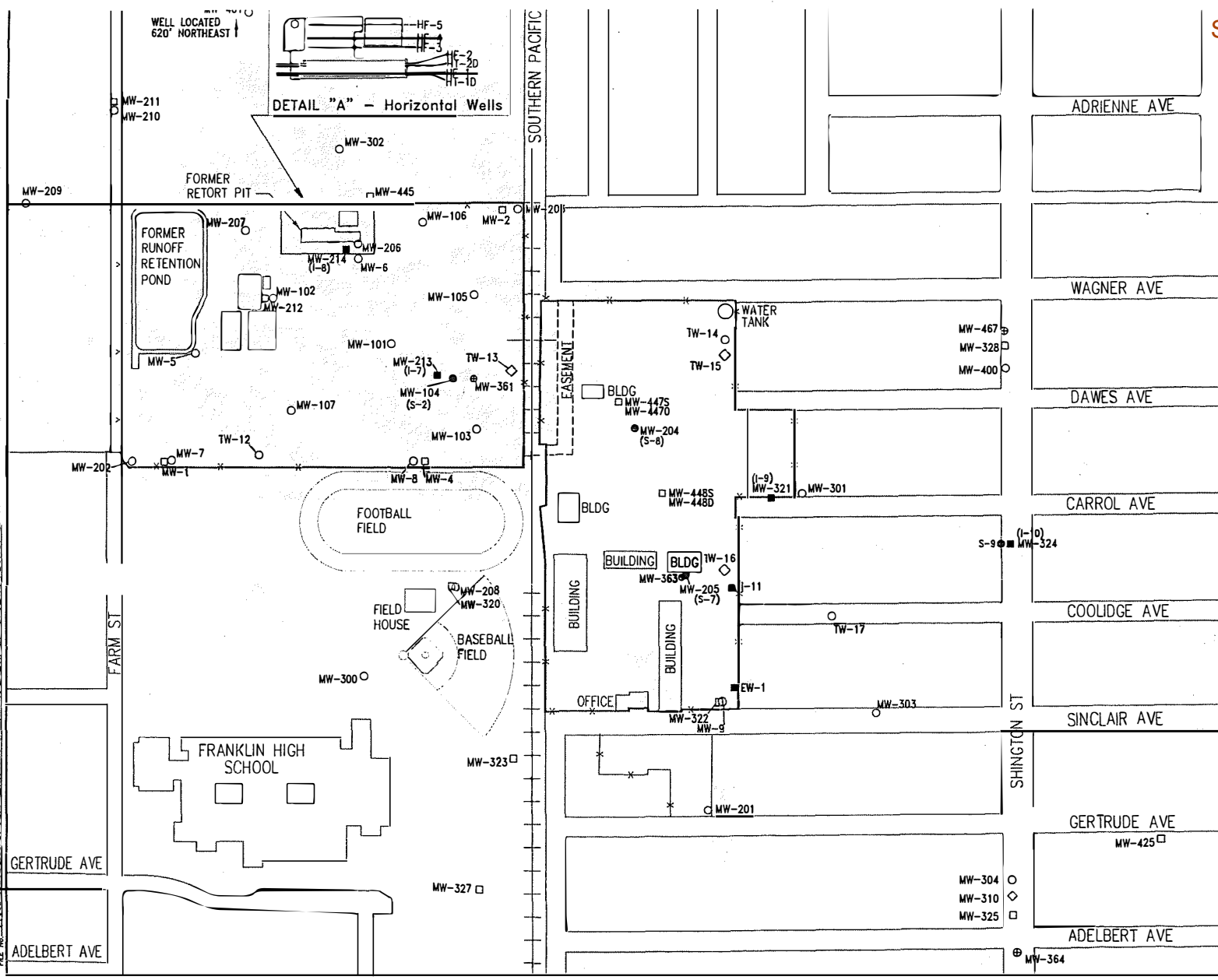
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WELL LOCATED 620' NORTHEAST



### Scanned Document

- LEGEND**
- SHALLOW ZONE WELLS**  
 MW-5 ○ MONITOR WELL  
 MW-104 (S-2) ● RECLAMATION WELL  
 100-FOOT SAND WELLS  
 TW-13 ◇ MONITOR WELL
- INTERMEDIATE ZONE WELLS**  
 MW-1 □ MONITOR WELL  
 I-7 ■ RECLAMATION WELL
- DEEP ZONE WELLS**  
 MW-361 ⊕ MONITOR WELL  
 MW-363 (D-1) ⊕ RECLAMATION WELL
- x — x — FENCE  
 ———— PROPERTY LINE



**MWH**  
 FORMER MARLEY COOLING TOWER COMPANY  
 STOCKTON, CALIFORNIA

SITE PLAN  
 FIGURE 2