CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION
895 Aerovista Place, Suite 101
San Luis Obispo, California 93401-7906

DRAFT WASTE DISCHARGE REQUIREMENTS

ORDER NO. R3-2011-0209

FOR THE
OLIN TREATED GROUNDWATER REINJECTION FACILITY
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board), finds that:

PURPOSE OF ORDER

1. Cleanup and Abatement Order (CAO) No. R3-2007-0077 requires Olin Corporation (hereafter "Olin" or "Discharger") to implement and complete all necessary investigations and remedial actions (hydraulic control and clean up) associated with perchlorate plumes related to the Olin facility located at 425 Tennant Avenue in Morgan Hill (Site). These Waste Discharge Requirements allow Olin to reinject treated groundwater as part of their cleanup strategy to remediate perchlorate in offsite groundwater consistent with the CAO. These Waste Discharge Requirements are necessary because the Discharger plans to reinject treated groundwater with higher nitrate concentration than in the receiving water. However, the Olin Site is not a source for nitrates in groundwater.

2. On July 1, 2010, the Discharger submitted a feasibility study that serves as a Report of Waste Discharge (ROWD) in accordance with Section 13260 of the California Water Code. The Discharger submitted the feasibility study pursuant to CAO No. R3-2007-0077 and it supports the Discharger's need to operate an aquifer containment and cleanup system (ACS) to cleanup the offsite perchlorate groundwater plume in the intermediate and deep aquifers.

3. Since 2004, the Discharger has successfully operated an onsite ACS to cleanup groundwater in the shallow and upper intermediate aquifer zones beneath the site. The Discharger also successfully operates an onsite reinjection system that returns treated groundwater from the onsite treatment system to the shallow aquifer beneath the site. To remove perchlorate in offsite groundwater, the Discharger plans to expand the onsite treatment and reinjection system. These Waste Discharge Requirements, Order No. R3-2011-0209 (hereafter "Order") cover operation of the onsite and offsite ACS and rescind the Discharger's enrollment into the General Waiver of Waste Discharge Requirements Resolution No. R3-2008-0010 for the onsite treatment system reinjection upon startup of the offsite ACS.

4. This Order reflects current groundwater treatment and disposal to land practices, protects the beneficial uses of the receiving water via discharge and receiving water specifications, and is consistent with the State Water Resources Control Board's (State Water Board)

Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (Resolution 68-16[1]).

SITE OWNER AND LOCATION

5. The Discharger caused or permitted the discharge of perchlorate to waters of the state from the former Olin manufacturing facility in Morgan Hill. The Site consists of a 13-acre parcel located at 425 Tennant Avenue, Morgan Hill, Santa Clara County, as shown on **Figure 1**. The Site is approximately 30 miles southeast of San Jose and 0.5 miles west of Highway 101 in the City of Morgan Hill. The property (Assessor Parcel Number 817-029-028) is zoned light industrial and is surrounded primarily by commercial property. The Site property is vacant with the exception of a small treatment system and trailer but all permanent building structures have been removed. Rural residential, agricultural, and urban land uses exist beyond and downgradient of the site. The geographic coordinates are 121°, 38', 9" W, 37°, 7', 0" N.

SITE/FACILITY DESCRIPTION

6. The Discharger manufactured signal flares at the Site for approximately 32 years from 1956 to 1988. Standard Fusee Corporation leased the facility and manufactured signal flares for approximately seven years, from 1988 to 1995. The Discharger has been the sole property owner from at least 1956 to present. Potassium perchlorate was used by the Discharger and Standard Fusee Corporation to manufacture flares from 1956 to 1995. The Discharger and Standard Fusee Corporation stored and used potassium perchlorate at the facility to manufacture highway safety flares. Perchlorate was first detected at the Site in August 2000, during a due diligence investigation by a potential buyer. Perchlorate discharges likely originated from the Discharger's burn mix area near one of the onsite buildings and from accidental spills. The Central Coast Water Board did not formally regulate waste disposal practices while the flare manufacturing facility was in operation.

7. **Existing Groundwater Treatment –** On December 8, 2003, the Central Coast Water Board issued General Waiver of Waste Discharge Requirements Resolution No. R3-2002-0115 (General Waiver). Enrollment in the General Waiver authorized the discharge of treated groundwater to the City of Morgan Hill's Butterfield Retention Basin. In April 2004, the Discharger completed construction and testing and commenced operation (and continues to operate) the onsite hydraulic containment and treatment system. The Discharger has operated the onsite treatment system at a rate ranging from 15 to 175 gallons per minute (gpm). On November 2, 2005, the Central Coast Water Board conditionally amended the General Waiver. The General Waiver amendment authorized the discharge of treated groundwater via onsite recharge (injection) wells. The Discharger began reinjection of treated water in March 2006. In May 2008, the Central Coast Water Board enrolled the Discharger in an updated General Waiver (Resolution No. R3-2008-0010).

[1] A copy of Resolution No. 68-16 (sometimes called the "Anti-Degradation Policy") is available at the following web site address: http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/1968/rs68_016.pdf

The Discharger extracts polluted groundwater from onsite wells and pumps it to a 10,000-gallon equalization tank, then through bag filters and two perchlorate-specific ion exchange (IX) vessels in series. The Discharger pipes the treated water into a 10,000-gallon above-ground storage tank, which is then discharged to the shallow aquifer via injection wells located in the northern portion of the site. Groundwater is currently extracted (fourth quarter 2010) from the shallow and upper-intermediate aquifers via extraction wells at a rate of 33 gpm (approximately 48,000 gallons per day) and at an average perchlorate influent concentration of 54 micrograms per liter (µg/L). The perchlorate-specific ion-exchange resin removes the perchlorate to below the laboratory method detection limit (typically between 1.2 and 1.6 µg/L) before reinjection of treated groundwater into the ground. As of March 3, 2006, the Discharger has injected treated groundwater into the shallow aquifer using three injection wells. The capacity of the existing treatment system is 275 gpm, however, the system operates below full capacity because the current flow rate is sufficient to capture the onsite perchlorate plume. As of the fourth quarter 2010, the Discharger has treated approximately 266,974,000 gallons of perchlorate-impacted groundwater with the onsite treatment system and removed approximately 99 pounds of perchlorate.

8. **Expanded Groundwater Treatment System** – The expanded ACS facility, including extraction wells and conveyance pipelines, is depicted on **Figure 1**. The expanded ACS consists of a perchlorate-specific ion-exchange treatment system, 7,200 feet of buried pipeline, offsite extraction wells, new onsite injection wells, and computer controlled pumps and alarms. The Discharger proposes extraction of perchlorate from one intermediate aquifer well at between 300 to 400 gpm and from one deep aquifer extraction well at a combined flow rate estimated up to 530 gpm. The expanded ACS will result in an expansion of the capacity of the current treatment system from 275 gpm to 750 gpm, which provides spare capacity. The ACS will remove perchlorate at an estimated influent average concentration of approximately 21 µg/L to below method detection limits[2] (MDL; typically between 1.2 and 1.6 µg/L). Although the Feasibility Study indicates that an average rate of 300 to 400 gpm may be necessary to capture the core of the perchlorate plume in the intermediate aquifer, actual extraction rates from the intermediate and deep aquifer will need to be verified in the field and will vary depending on compliance with the effluent limits specified in this Order and potential changes in extraction rates that are required for remedial optimization over the life of the system. **Figure 2** is a schematic of the proposed ACS system, and conceptual model of the hydrogeology, supply wells, extraction wells, injection well system, and receiving water.

   The Discharger currently reinjects treated groundwater via three shallow aquifer injection wells. The Discharger proposes that an additional 475 gpm injection capacity is needed to manage treated water from the expanded ACS. The Discharger intends to increase capacity by installing additional aquifer injection wells at the site.

[2] The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero (i.e., an estimate).

GEOLOGY AND HYDROGEOLOGY

9. **Regional Geology and Hydrogeology** - The four- to five-mile wide Llagas Subbasin comprises the southern part of the north-northwest-trending Santa Clara Valley. The valley floor has an elevation of about 400 feet above mean sea level (MSL) near Morgan Hill, and slopes to an elevation of about 140 feet at the Pajaro River outlet in the southwest corner of the valley. This Subbasin is in part separated from the Hollister Valley to the south-southeast by the Lomerías Muertas and Flint Hills, and is separated from the northern Santa Clara Valley in the vicinity of the Coyote Narrows and the Coyote Creek drainage divide near Morgan Hill (DWR 118, 1981)[3].

   The Site is located in the Llagas Subbasin of the Gilroy-Hollister Groundwater Basin in south Santa Clara County. The Llagas Subbasin is a northwest to southeast trending alluvial-filled structural depression that is, in part, the southern extension of the north bounding Coyote Valley Groundwater Subbasin. The Llagas Subbasin's northern boundary consists of a groundwater divide that is believed to coincide with the topographic high near where the Coyote Creek emerges from the eastern foothills. The Llagas Subbasin is further bounded on the west by the Santa Cruz Mountains/Gavilan Range and on the east by the Diablo Range, and merges to the south with the Gilroy-Hollister Groundwater Subbasin. The Tertiary- to Mesozoic-age bedrock forming these mountain ranges is relatively impermeable and limits the extent of groundwater movement to the east and west and at depth. The regional and local aquifer systems are composed of alluvial deposits over valley basin bedrock and include Pliocene to Holocene age continental deposits of unconsolidated to semi-consolidated gravel, sand, silt, and clay.

10. **Site Stratigraphy and Hydrogeology:** Groundwater occurs within the Llagas Subbasin in coarse-grained aquifer units deposited by alluvial (moving water) processes and dominated by fluvial (developed stream) systems of the current and historical streams in the area. Olin's extensive hydrogeological investigations show a division of the basin sediments into three main aquifers 1) the shallow aquifer (surface to approximately 50 feet below ground surface [bgs]), 2) the intermediate aquifer (approximately 70 to 180 feet bgs), and 3) the deep aquifer (approximately 200 feet bgs to a maximum of over 500 feet bgs). The intermediate and deep aquifers are further subdivided into three water-bearing units apiece (upper, middle, and lower). The basin alluvial sediments overlie impermeable slope debris and bedrock at a maximum depth of over 500 feet beneath the center axis of the Llagas Subbasin southeast of the site.

    First encountered groundwater (the shallow aquifer) generally occurs between 15 and 30 feet bgs and fluctuates seasonally. Although relatively permeable, the shallow aquifer is not deep enough to be used for domestic or municipal supply because drinking water wells are required to have a minimum 50-foot sanitary seal (from the surface) if they are used for domestic or municipal supply. According to geologic cross sections, the aquitard at the base of the shallow aquifer occurs as a continuous unit below and to the south (downgradient) of the Site but pinches out in areas east and southeast of the site. The intermediate aquifer is relatively permeable and most domestic supply wells in the Llagas Subbasin are screened in this aquifer. In general, regional groundwater flow is toward the

[3] DWR (California Department of Water Resources). 2003. California's Groundwater Update 2003. Bulletin 118.

southeast in all three aquifers, however, there is a potential for northward flow in the middle deep and lower deep aquifer zones in the area northeast of the Olin Site due to pumping of the City of Morgan Hill's municipal supply wells to the north.

A downward gradient between the three aquifers results from significant artificial recharge at the Santa Clara Valley Water District's percolation ponds in the northern portion of the Llagas Subbasin (northeast and east of the site) combined with significant pumping from the lower portion of the intermediate aquifer and the deep aquifers by City of Morgan Hill municipal wells. The potential for vertical downward flow is greater beneath the City of Morgan Hill (i.e., within 1.5 miles of the site) than areas farther south.

SURFACE WATER/STORMWATER

11. **Surface Water** - The southern Santa Clara Valley is naturally drained by Llagas Creek. This creek begins in the Santa Cruz Mountains along the west side of the valley. After entering the valley near Morgan Hill, Llagas Creek flows southward down the valley axis. The Little Llagas and Uvas (Carnadero) Creeks are major tributaries feeding into Llagas Creek, and both flow from the Santa Cruz Mountains on the west. At the south end of the valley, Llagas Creek joins the Pajaro River, which flows westward to the Pacific Ocean at Monterey Bay. Thus, with respect to watershed hydrology, the Llagas is an open basin, with overland flow able to exit the valley via the Pajaro River. Unlike drainage from the Santa Cruz Mountains on the west, most of the Diablo Range adjoining the eastern side of the Llagas is drained northward to San Francisco Bay via Coyote Creek. The Little Llagas Creek crosses over the plume approximately one-mile downgradient of the Site near Seymour Avenue in San Martin.

12. **Stormwater** – The Site is relatively flat. Surface soils are coarse grained so rainwater generally infiltrates into the ground fairly rapidly.

GROUNDWATER QUALITY

13. **Groundwater Use** - Residents, agricultural operations, businesses and cities surrounding and downgradient of the Site rely solely on groundwater for domestic, agricultural, and industrial supply purposes. The City's Tennant Well is located approximately 250 feet southwest of the site. The City's other municipal supply wells are located north to northeast of the site, ranging from three-quarters to two miles away. Many domestic wells are located downgradient (south and southeast) of the site. In 2004, over 180 offsite domestic wells had perchlorate detections above the maximum contaminant level (MCL) of 6 µg/L. During the fourth quarter of 2010, a total of 12 domestic supply wells had concentrations of perchlorate greater than the MCL and all the users of these wells are provided replacement water (e.g., bottled water or ion-exchange at the wellhead).

14. **Perchlorate in Groundwater -** The Discharger monitors groundwater beneath the Site and throughout the Llagas Subbasin, both upgradient (generally north and northeast) and downgradient (generally south, southeast, and east) of the Site pursuant to an Executive Officer-approved Monitoring and Reporting Program (MRP). Historically, the perchlorate

plume extended laterally and vertically south and southeast of the site, with a length of 9.5 miles, width of 2,000 feet, and a depth to approximately 500 feet deep in some areas. However, over the past five years the plume has shrunk due to Olin's successful onsite soil remediation activities, continued operation of the onsite groundwater pump and treat system, offsite wellhead treatment systems, along with natural attenuation processes.

The Discharger divided the perchlorate plume into priority zones based on concentrations (i.e., Priority Zones A, B, and C) to more easily manage the plume for remediation purposes. The Discharger defines Priority Zone A as the "plume core", characterized by groundwater containing perchlorate concentrations above 24.5 µg/L. Priority Zones B and C are defined by groundwater containing perchlorate at concentrations between 24.5 and >11.0 µg/L, and between 11.0 and >6.0 µg/L, respectively. The area of impact includes, but is not limited to, those areas shown in **Figures 3, 4, and 5** for the intermediate, middle deep, and lower deep aquifers, respectively. The distribution of perchlorate within the Llagas Subbasin is described most recently in MACTEC's Fourth Quarter 2010 Groundwater Monitoring Report, dated January 31, 2011.[4]

15. **Nitrate in Groundwater** – This Order considers the potential nitrate impacts, associated with reinjection from the ACS, on municipal and domestic groundwater use in the area. The nitrate concentrations are elevated in portions of the Llagas Subbasin (in many areas above the nitrate drinking water standard of 45 milligrams per liter [mg/L] as NO_3). Many studies attribute the elevated nitrate to agricultural and other anthropogenic activities[5]; the Olin Site is not the source of elevated nitrate in the area. The concentration of nitrate varies considerably both laterally and vertically in the aquifers within the hydraulic containment area of the proposed ACS system and in the area influenced by reinjection (hereafter "ACS recharge area"). According to the Feasibility Study, the current average nitrate concentrations in the shallow aquifer and intermediate aquifer in the ACS recharge area are 24.1 and 33.3 mg/L, respectively, based on samples collected from monitoring wells. **Figures 6 and 7** demonstrate significant nitrate distribution variability, including high nitrate concentrations of 69 and 84 mg/L in the shallow and intermediate aquifers, respectively. **Figures 8, 9, and 10** depict areas downgradient of the Site in the shallow, upper intermediate, and middle intermediate aquifers, respectively, that the Feasibility Study predicts will be influenced by ACS recharge. Under the current ACS configuration, the Discharger anticipates a maximum nitrate effluent concentration of 38 mg/L in the discharge to the shallow aquifer, which is below the MCL for nitrate. Based on the existing nitrate concentrations in the Llagas Subbasin and the maximum concentration anticipated in the treated groundwater, future concentrations of nitrate are expected to increase in the shallow aquifer and nitrate is expected to increase in some areas and decrease in other areas locally within the intermediate aquifer. With respect to municipal use, the City of Morgan Hill obtains its water from groundwater wells screened in the intermediate and deep aquifers. With the exception of the Tennant Well (which is screened in the lower intermediate and deep aquifers and located directly southwest of the site), no other City of Morgan Hill wells are located within the estimated ACS recharge area. In the early 1990's, groundwater extracted from the Tennant Well exhibited concentrations significantly above the MCL for

[4] http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL0608756247

[5] E.G., Moran, J.E. et al., 2005. California GAMA Program: Sources and Transport of Nitrate in Shallow Groundwater in the Llagas Basin of Santa Clara County, California. July 2005.

nitrate at 45 mg/L, but nitrate has since fallen to below 30 mg/L in this well. Conservative estimates indicate that the ACS recharge may result in an increase of nitrate in the Tennant Well by up to 2 mg/L. There are also approximately 24 domestic wells are in the ACS recharge area. Domestic wells in the area are screened in one or more zones of the intermediate aquifer and future nitrate concentrations within these wells may increase or decrease depending on location and existing nitrate concentrations. In no case will the discharge cause nitrate concentrations to exceed the MCL because the effluent limit is 39 mg/L (below the drinking water standard of 45 mg/L).

BASIN PLAN

16. The Central Coast Water Board adopted the *Water Quality Control Plan, Central Coast Basin* (the Basin Plan) that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for receiving waters within the Region.

    Present and anticipated beneficial uses of groundwater in the vicinity of the Morgan Hill and San Martin portions of the Llagas Subbasin include municipal, domestic, agricultural, and industrial water supply.

17. For receiving waters with designated beneficial uses of municipal and domestic water supply, the Basin Plan establishes the primary drinking water maximum contaminant levels (MCLs), listed in Title 22 of the California Code of Regulations, Sections 64431 (inorganic compounds) and 64444 (organic compounds), as applicable water quality objectives.

18. The Basin Plan establishes certain water quality objectives for selected groundwaters in the Llagas Subbasin. These objectives are intended to serve as a water quality baseline for evaluating water quality management in the basin. The median groundwater quality objectives are at best representative of gross areas only. Application of these objectives must reflect the actual groundwater quality present.

MONITORING PROGRAM

19. The Discharger is required to monitor groundwater in accordance with an Executive Officer-approved MRP associated with CAO No. R3-2007-0077. The MRP requires receiving water (groundwater) sampling and analyses for perchlorate and nitrate and staff will update it to verify compliance with this Order, as necessary. The current MRP No. R3-2008-0028 as updated by Central Coast Water Board staff on July 12, 2010, requires receiving water sampling and analyses at frequencies ranging from quarterly to annually, submittal of quarterly self-monitoring reports, and an annual summary report submitted by January 30th of each year. The Discharger also operates the ACS according to an Executive Officer-approved Operation, Maintenance, and Monitoring (OMM) plan. Under the OMM plan, the Discharger collects monthly effluent samples for groundwater parameters in addition to nitrate and perchlorate. The groundwater parameters include chloride, sulfate, pH, total dissolved solids, and conductivity. Central Coast Water Board staff expects these parameters to continue to be well below or within the range of Secondary Maximum

Contaminant Levels in the treated effluent, according to samples collected to date from wells within the zone of influence of the ACS recharge.

ANTIDEGRADATION

20. The State Water Board Resolution 68-16 states, in part:

> *Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in best practicable treatment and control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.*

The proposed discharge by injection of highly treated groundwater as authorized in this Order is consistent with Resolution 68-16 because the proposed action will extract groundwater containing perchlorate above drinking water standards, and treat the groundwater to reduce perchlorate concentrations to non-detectable levels. This proposed treatment constitutes "best practicable treatment or control" because it uses a perchlorate-specific ion exchange resin to remove perchlorate, which is considered the best available method to remove perchlorate. The Discharger has been using the same treatment system effectively for at least seven years. The use of this treatment will assure that a pollution (i.e., perchlorate will be treated to below water quality objectives, in this case, the MCL) or nuisance will not occur since the perchlorate concentrations of the treated groundwater are below detectable levels.

21. As described in Findings 15 and 22, discharge of the treated groundwater will also contain nitrate at concentrations that will likely exceed the receiving water concentrations, but the discharge of the treated groundwater will never result in exceedances of the MCL for nitrate in the receiving water. The shallow aquifer is not deep enough to be used for domestic or municipal supply because drinking water wells require a minimum 50-foot sanitary seal for use in domestic or municipal supply. Some degradation of the shallow aquifer is, therefore, consistent with Resolution 68-16 because any degradation that could occur in the shallow aquifer associated with nitrate from this discharge (effluent limit = 39 mg/L) will remain below the drinking water standard (45 mg/L), as described in the next finding. The overall action is consistent with the maximum benefit to the people of the state because the cleanup of perchlorate (the predominant constituents of concern from Olin's operations), even with some degradation due to nitrate, will result in restoring the aquifers to concentrations below drinking water standards for perchlorate, and will restore the beneficial uses of the aquifers.

22. This Order sets an effluent discharge limit of 39 mg/L which is below the MCL of 45 mg/L nitrate as NO_3. Based on the current nitrate distribution, the initial effluent nitrate concentration will likely be lower than 39 mg/L and reduce with time. As shown in Figures **8, 9, and 10**, after 10 years of ACS operation the percent reinjected water in the vicinity of the Site will progressively diminish with depth as a result of dilution from nearly 100 percent reinjected water in the shallow aquifer, 50 percent of groundwater is reinjected water in the

upper intermediate aquifer, to less than 30 percent in the middle intermediate aquifer, and less than ten percent in the lower intermediate aquifer.

The City of Morgan Hill's Tennant Well is screened in the lower intermediate and deep aquifer. Based on available information, nitrate increases in the shallow aquifer resulting from ACS recharge after 10 years of operation may result in a corresponding increase in nitrate at the Tennant Well of up to 2 mg/L resulting in an estimated increase in the Tennant Well nitrate concentrations from 28 mg/L to 30 mg/L. The estimated increase in nitrate concentrations is based on the estimated percentages and on conservatively using one-half the perchlorate attenuation factor experienced at the Tennant Well. For example, after about 50 years of perchlorate transport from the site, the concentration of perchlorate in groundwater extracted by the Tennant Well is approximately $1/20^{th}$ of the concentration in the shallow aquifer at the site. Perchlorate is a good surrogate for nitrate because it has similar fate and transport characteristics in groundwater. Therefore, the Tennant Well may experience a slight increase in nitrate concentration, estimated at 2 mg/L or less, but the resultant concentrations will be significantly below the MCL (45 mg/L) or any other known Department of Public Health-required action levels (e.g., typically 40 mg/L requires centralized blending, if concentrations are highly variable or increasing).

Approximately 24 domestic wells are in the projected area influenced by ACS recharge and three wells are located in the "core" area where the Discharger anticipates the ACS recharge to be greater than 50 percent in the upper intermediate aquifer (**Figure 9**). Domestic wells in the San Martin area are primarily screened in the intermediate aquifer. When the water from the ACS recharge mixes with the groundwater surrounding the domestic well the resultant nitrate concentration will decrease for some domestic wells and potentially increase for a few domestic wells. However, the maximum allowable quarterly average nitrate concentration in the recharge water is 39 mg/L. Therefore the ACS recharge will never cause an increase in nitrate in any domestic well (or municipal well) that would result in an exceedance of the MCL. The resulting nitrate concentration will depend on 1) the percent of recharge water that mixes with the groundwater surrounding the domestic supply well screen, and 2) the existing nitrate concentration in groundwater surrounding the domestic supply well. Although slight changes in nitrate concentrations will occur (both up and down), the perchlorate concentration will decrease over time due to the cleanup efforts and nitrate concentrations are expected to decline due to ongoing changes in surrounding land use that result in reduction of nitrate loading to the land.

23. A robust Executive Officer-approved MRP will be in place to monitor changes in perchlorate and nitrate concentrations in the shallow, intermediate, and deep aquifers. The MRP will require monitoring of sentry wells which will provide early indication of the ACS recharge's impact on the intermediate aquifer prior to that impact reaching the Tennant Well and other supply wells in the area of influence of the ACS recharge. As a result, if in the unlikely event significant increases (beyond those described above) in nitrate concentrations do occur, they can be detected, evaluated, and addressed, as appropriate.

24. An Executive Officer-approved OMM plan will be in place that requires monthly effluent sample collection and laboratory analyses for perchlorate and nitrate, and instantaneous monitoring for nitrate in the treatment stream using in-line analyzers. Instantaneous

monitoring of nitrate allows for timely system adjustments and potential shut downs, if necessary.

25. Nitrate in local groundwater is unrelated to the Discharger's operations and without the elevated nitrate concentrations, the Central Coast Water Board would regulate this discharge under the General Waiver of Waste Discharge Requirements Resolution No. R3-2008-0010 instead of this Order.

26. The permitted discharge is consistent with State Water Board Resolution 68-16. The discharge regulated by this Order is subject to waste discharge requirements that will result in treatment, control, prevention of pollution and nuisance, and maintenance of water quality. Although nitrate concentrations will increase locally in the shallow aquifer (that is not currently being used as a source of drinking water) and to a lesser extent in the intermediate aquifer, with some portions of the intermediate aquifer predicted to experience decreases in nitrate concentration, this Order is consistent with the maximum benefit to the people of the State because the Discharger will remove perchlorate and restore the beneficial uses of the aquifers currently affected by perchlorate.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

27. On July 14, 2011, the Central Coast Water Board adopted Resolution No. R3-2011-0210 approving a Mitigated Negative Declaration and Initial Environmental Study (IES) addressing the ACS project in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code, Section 21000, et seq.) and the California Code of Regulations. The Central Coast Water Board is the lead agency for purposes of CEQA. The Mitigated Negative Declaration and IES identified that the project could result in potentially significant environmental affects with respect to noise and air quality that may result from the ACS construction, primarily during pipeline installation, but that the identified affects could be reduced to insignificant with mitigation. The Mitigated Negative Declaration identified mitigation measures to address the potential noise and air quality impacts. The IES concluded that significant affects on water quality will not occur because the proposed actions are subject to waste discharge requirements that require use of best practicable treatment or control of the discharge, do not allow any exceedances of applicable water quality objectives, and result in restoring beneficial uses of impacted groundwater. The impact is less than significant because the project includes system controls and monitoring that will ensure treatment of perchlorate-impacted groundwater to below the cleanup level, thereby producing treated groundwater that is consistent with the maximum benefit of the people of the state in accordance with State Water Board Resolution 68-16.

    Per CEQA Guidelines section 15070, the Central Coast Water Board approved a Mitigated Negative Declaration because revisions in the project plans agreed to by the applicant (Olin) will avoid or mitigate the effects such that no significant effects will occur with respect to noise and air quality. The Discharger will follow a plan for monitoring compliance with local and State noise and air quality requirements and ensuring effective mitigation measures are implemented, if needed.

GENERAL FINDINGS/EXISTING ORDERS

28. The discharge from the existing onsite groundwater treatment system is currently regulated through enrollment in the General Waiver of Waste Discharge Requirements Resolution No. R3-2008-0010 (General Waiver) for specific types of discharges, including treated groundwater.

29. **Replacement Water -** On July 7, 2004, the Central Coast Water Board issued Cleanup and Abatement Order No. R3-2004-0101 (Order No. 0101) to require the Discharger and Standard Fusee to provide replacement water to affected well owners. Presently, the Discharger provides replacement water to well users whose wells have perchlorate concentrations greater than 6.0 micrograms per liter (µg/L), in accordance with Order No. 0101, as revised by State Water Board Order WQ 2005-0007, adopted on May 19, 2005, and Central Coast Water Board staff's letters dated October 6, 2006 and March 23, 2010.

30. **Groundwater Characterization and Cleanup -** The Central Coast Water Board issued CAO No. R3-2007-0077 on December 14, 2007. CAO No. R3-2007-0077 requires the Discharger to complete basin characterization and conduct groundwater monitoring, complete design documents and initiate the offsite ACS for plume migration and control for Priority Zones A and B (intermediate aquifer), Priority Zone A (deep aquifer), and monitored attenuation for the remainder of the plume. CAO No. R3-2007-0077 establishes timeframes for offsite groundwater monitoring and cleanup, and requires submission of technical reports to support those activities. The Discharger has sufficiently completed basin characterization to proceed with offsite groundwater remediation.

31. **Stormwater** – During construction of the ACS, the Discharger shall follow requirements in the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Land Disturbance Activities, State Water Resources Control Board Order No. 2009-0009-DWQ General Permit for Construction Activities.

32. This Order contains restrictions on individual pollutants. The effluent limitations for perchlorate and nitrate are based on achievable limits for perchlorate-selective ion-exchange resin and blending of nitrate from the intermediate and deep aquifers. The requirements of this Order take into consideration past, present, and probable future beneficial uses of the receiving waters and environmental characteristics.

33. Discharge of treated groundwater is a privilege, not a right, and authorization to discharge is conditional upon the discharge complying with provisions of Division 7 of the California Water Code and any more stringent effluent limitations necessary to implement water quality control plans, to protect beneficial uses, and to prevent nuisance. Compliance with this Order should ensure this and mitigate any potential adverse changes in water quality due to the discharge.

34. On April 20, 2011, Central Coast Water Board staff notified the Discharger and interested agencies and persons of its intent to establish waste discharge requirements for this discharge and has provided them with a copy of the proposed Order and an opportunity to submit written views and comments. Interested parties were required to submit comments on the draft Order in writing no later than May 20, 2011.

35. Any person affected by this action of the Board may petition the State Water Board to review the action in accordance with Section 13320 of the California Water Code and Title 23 of the California Code of Regulations, Section 2050. The State Water Board must receive the petition within 30 days of the date of this Order. Copies of the law and regulations applicable to filing petitions will be provided upon request.

36. After considering all comments pertaining to this discharge, during a public hearing on July 14, 2011, this Order was found consistent with the above findings.

IT IS HEREBY ORDERED, pursuant to authority in Section 13263 and 13267 of the California Water Code, that Olin Corporation, its agents, successors, and assigns, may discharge waste from its groundwater treatment facility provided it complies with the following requirements.

All technical and monitoring reports submitted pursuant to this Order are required pursuant to Section 13267 of the California Water Code, as stipulated in CAO No. R3-2007-0077. The Central Coast Water Board requires these reports to determine compliance with this Order and the impacts, if any, of the discharge on receiving waters. 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 California Water Code.

A. DISCHARGE PROHIBITIONS

1. Discharge of any wastes to adjacent properties or adjacent drainage ways is prohibited.

2. Bypass of the treatment facility is prohibited and discharge of improperly treated groundwater is prohibited.

B. DISCHARGE SPECIFICATIONS

1. Daily flow averaged over each month shall not exceed 1,000 gallons per minute.

2. Effluent discharged to injection wells shall not exceed the following limitations:

Constituent	Units	Quarterly Average	Monthly Average
Perchlorate	µg/L	Trace detect[1]	4
Nitrate (as NO_3)	mg/L	39[2]	43[3]
pH	within the range 6.5 to 8.3		

[1] Below the laboratory MDL for perchlorate or no more than 33.3% trace detections between MDL and practical quantitation limit (PQL), based on monthly analytical results (or more

frequent, if necessary) from samples collected from the effluent over the quarter. Assumes a perchlorate PQL of 4.0 µg/L and MDL of up to 1.6 µg/L.

[2] Represents the maximum quarterly allowable nitrate concentration determined from certified laboratory analyses.

[3] As determined by certified laboratory analyses. If instantaneous readings from the inline effluent nitrate analyzer exceed 43 mg/L, the system shall be automatically shutdown and alarm sounded by the control system, and troubleshooting conducted pursuant to the OMM.

3. The Discharger shall notify Central Coast Water Board staff within 48 hours of effluent limit exceedances and associated shutdown of the ACS.

C. RECEIVING WATER (GROUNDWATER) LIMITATIONS

Receiving water quality varies as a result of many factors, some unrelated to the discharge. This Order considers these factors and is designed to minimize the influence of the discharge to receiving waters.

1. The discharge shall not cause groundwater to contain concentrations of organic or inorganic chemicals in excess of the limiting concentrations set forth in California Code of Regulations, Title 22, Division 4, Chapter 15, Article 5.5, Section 64444 (organic) and Article 4, Section 64431 (inorganic).

D. PROVISIONS

1. Enrollment in the General Waiver of Waste Discharge Requirements Resolution No. R3-2008-0010 (General Waiver) for treated groundwater from the onsite groundwater pump and treat system will be superceded by this Order when the expanded treatment system becomes operational. Enrollment into the General Waiver will remain in place for soil and groundwater waste streams associated with remediation activities, including well installation, testing, and monitoring activities.

2. Discharger shall comply with an Executive Officer-approved MRP.

3. This Order may be reopened to address any changes in State or Federal plans, policies, or regulations that would affect requirements for the reinjection of treated groundwater, or as determined necessary by the Central Coast Water Board or the Executive Officer.

4. The Discharger shall maintain an Executive Officer-approved comprehensive OMM for the groundwater extraction, treatment, and reinjection operations.

5. Pursuant to California Code of Regulations Title 23, Chapter 3, Subchapter 9, the Discharger shall submit a Report of Waste Discharge to the Executive Officer not later than November 14, 2015, addressing: a) whether there will be changes in the continuity, character, location or volume of the discharge; and, b) whether, in their opinion, there is any portion of the Order that is incorrect, obsolete, or otherwise in need of revision.

I, Roger W. Briggs, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Central Coast Region, on July 14, 2011.

ORDERED BY: _____
Roger W. Briggs, Executive Officer

_____
Date

ATTACHMENTS:

Figure 1 - Aquifer Containment & Cleanup System Infrastructure Layout
Figure 2 - Site Conceptual Model
Figure 3 - Perchlorate Results - Intermediate Aquifer
Figure 4 - Perchlorate Results - Middle Deep Aquifer
Figure 5 - Perchlorate Results - Lower Deep Aquifer
Figure 6 - Most Recent Nitrate Distribution in Shallow Aquifer within the ACS Recharge Zone of Influence
Figure 7 - Most Recent Nitrate Distribution in Intermediate Aquifer within the ACS Recharge Zone of Influence
Figure 8 - Percent ACS Recharge Water in Shallow Aquifer at 590 gpm Reinjection
Figure 9 - Percent ACS Recharge Water in Upper Intermediate at 590 gpm Reinjection
Figure 10 - Percent ACS Recharge Water in Middle Intermediate at 590 gpm Reinjection

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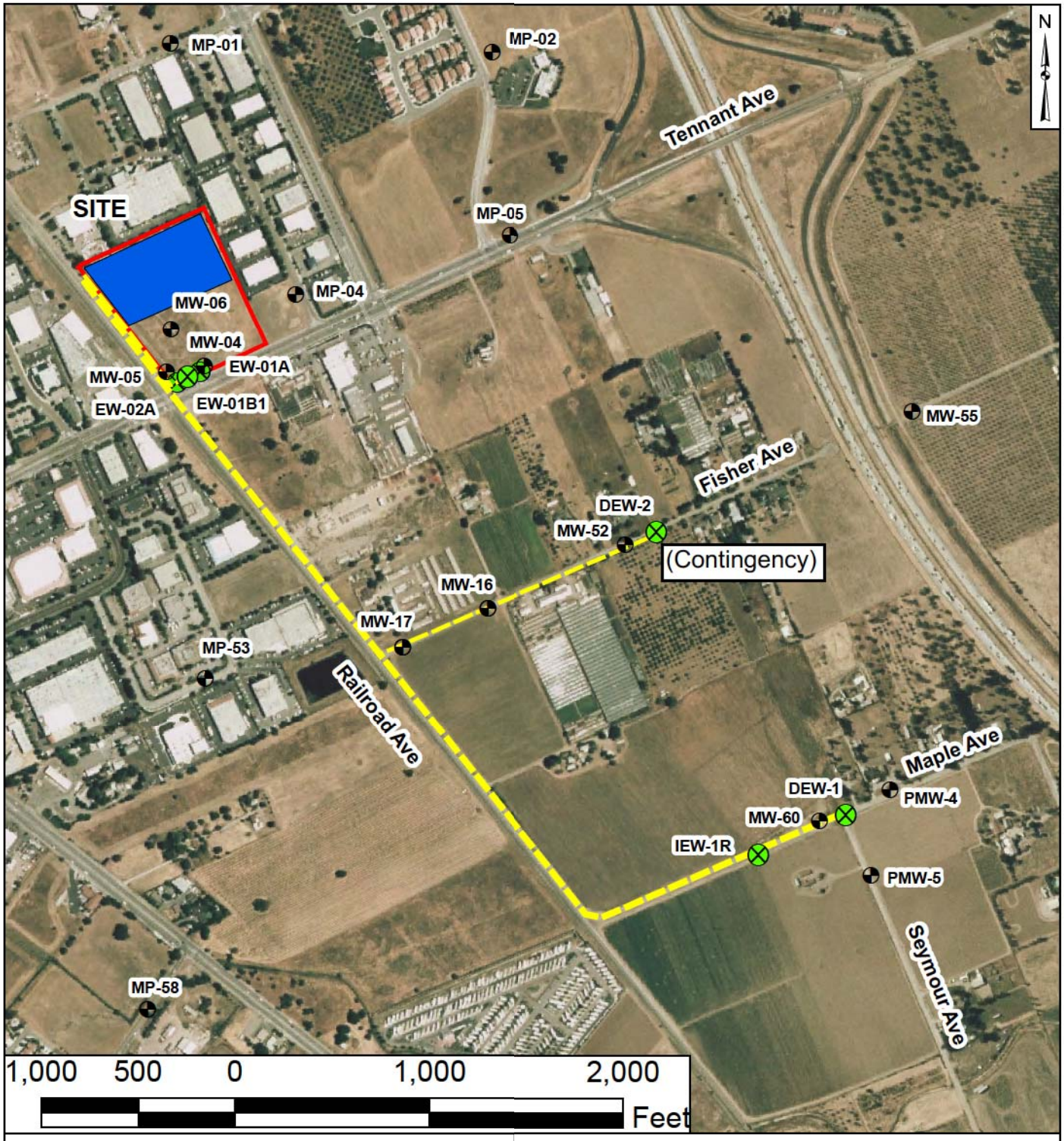

Legend

- Conveyance Piping
- Extraction Well
- Deep Aquifer Monitoring Well
- Treatment & Recharge System
- Site Boundary

Aquifer Containment & Cleanup System Infrastructure Layout

Groundwater Cleanup Plan
Olin/Standard Fusee Site, Morgan Hill, California

Geosyntec consultants	Olin	Figure 1
Kennesaw, Georgia	1-FEB-2011	

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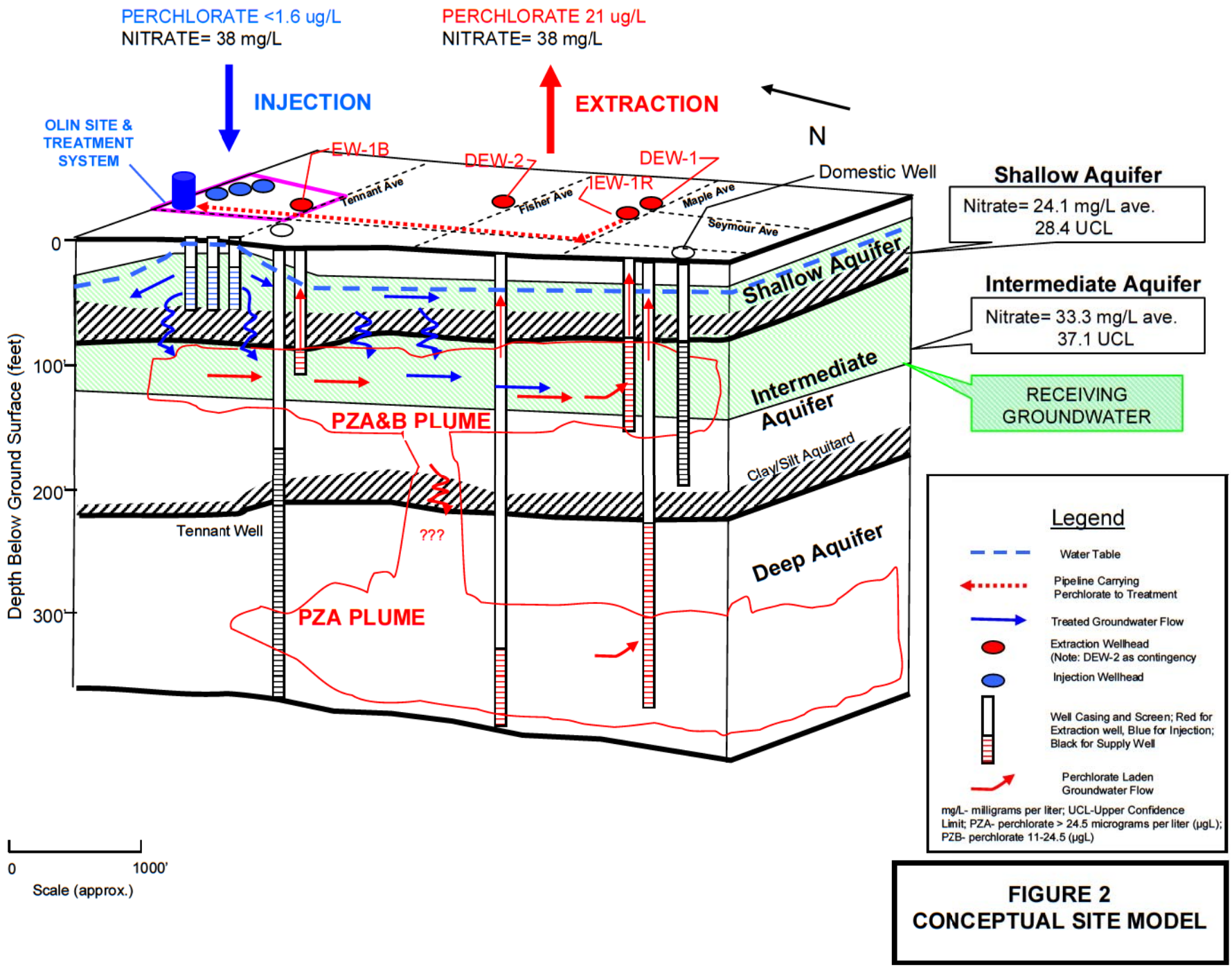
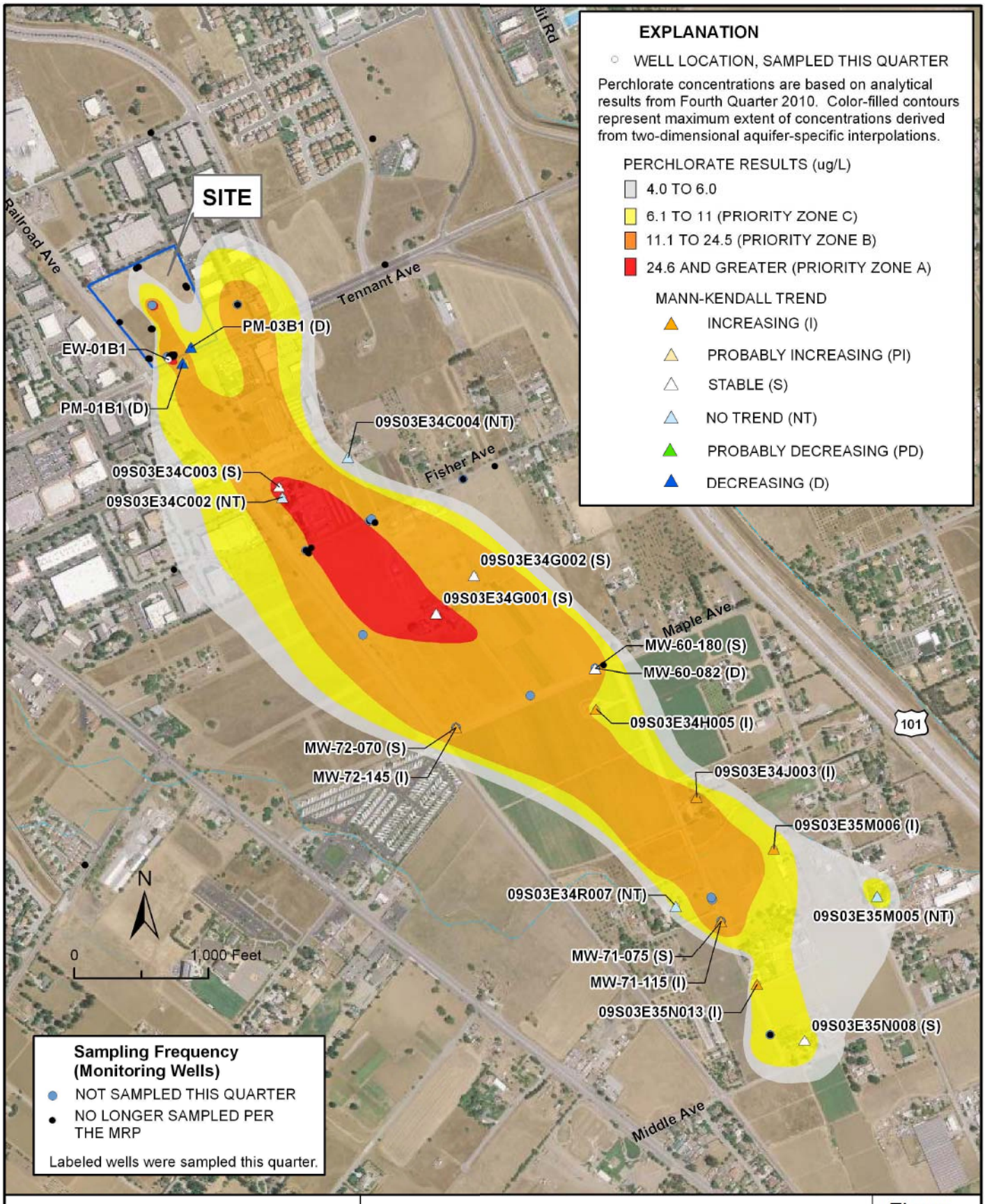


FIGURE 2
CONCEPTUAL SITE MODEL



MACTEC

Perchlorate Results - Intermediate Aquifer
2010 Annual Cleanup Progress Status Report
Olin/Standard Fusee Site
Morgan Hill, California

Figure 3

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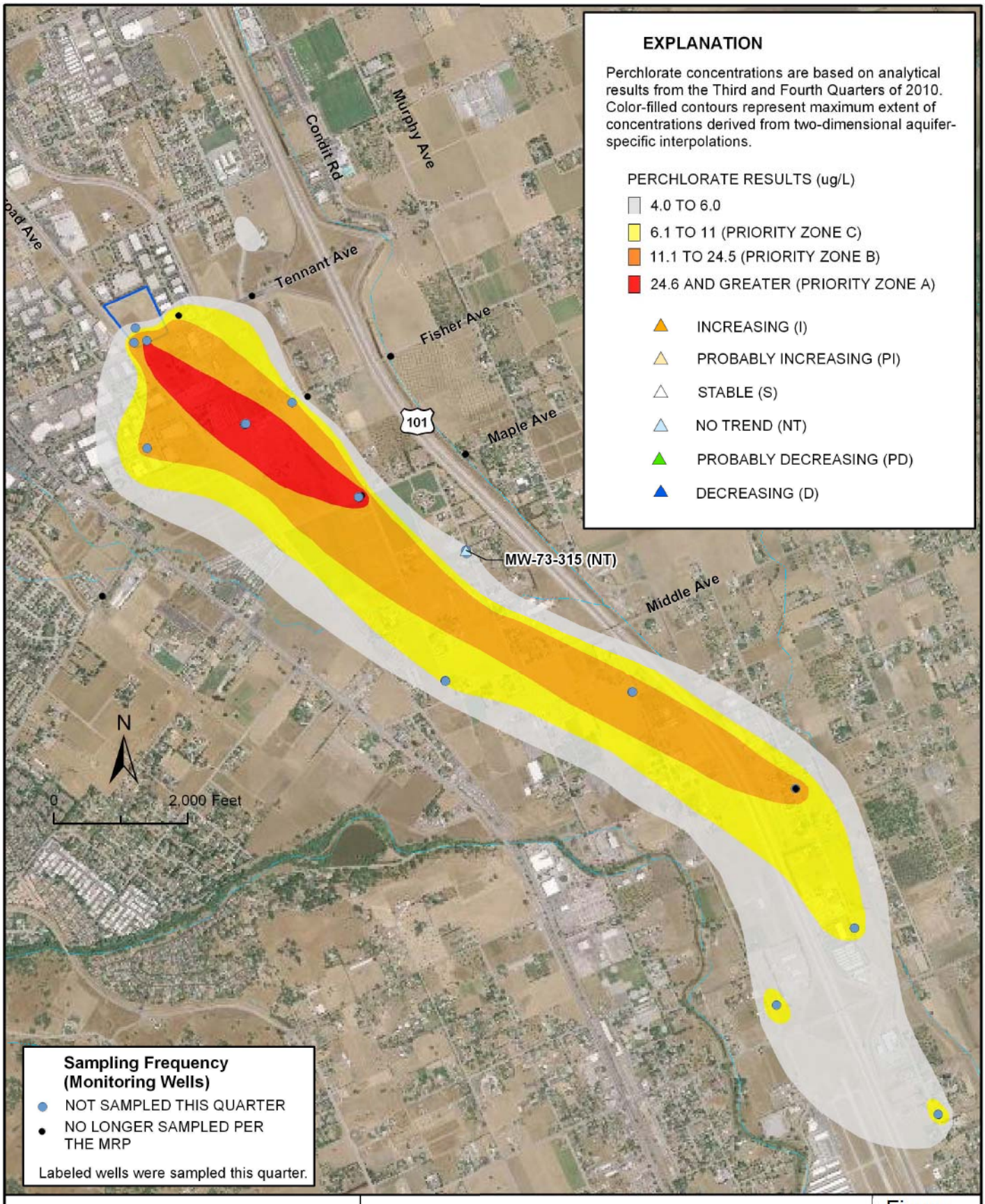

MACTEC

Perchlorate Results - Middle Deep Aquifer
2010 Annual Cleanup Progress Status Report
Olin/Standard Fusee Site
Morgan Hill, California

Figure 4

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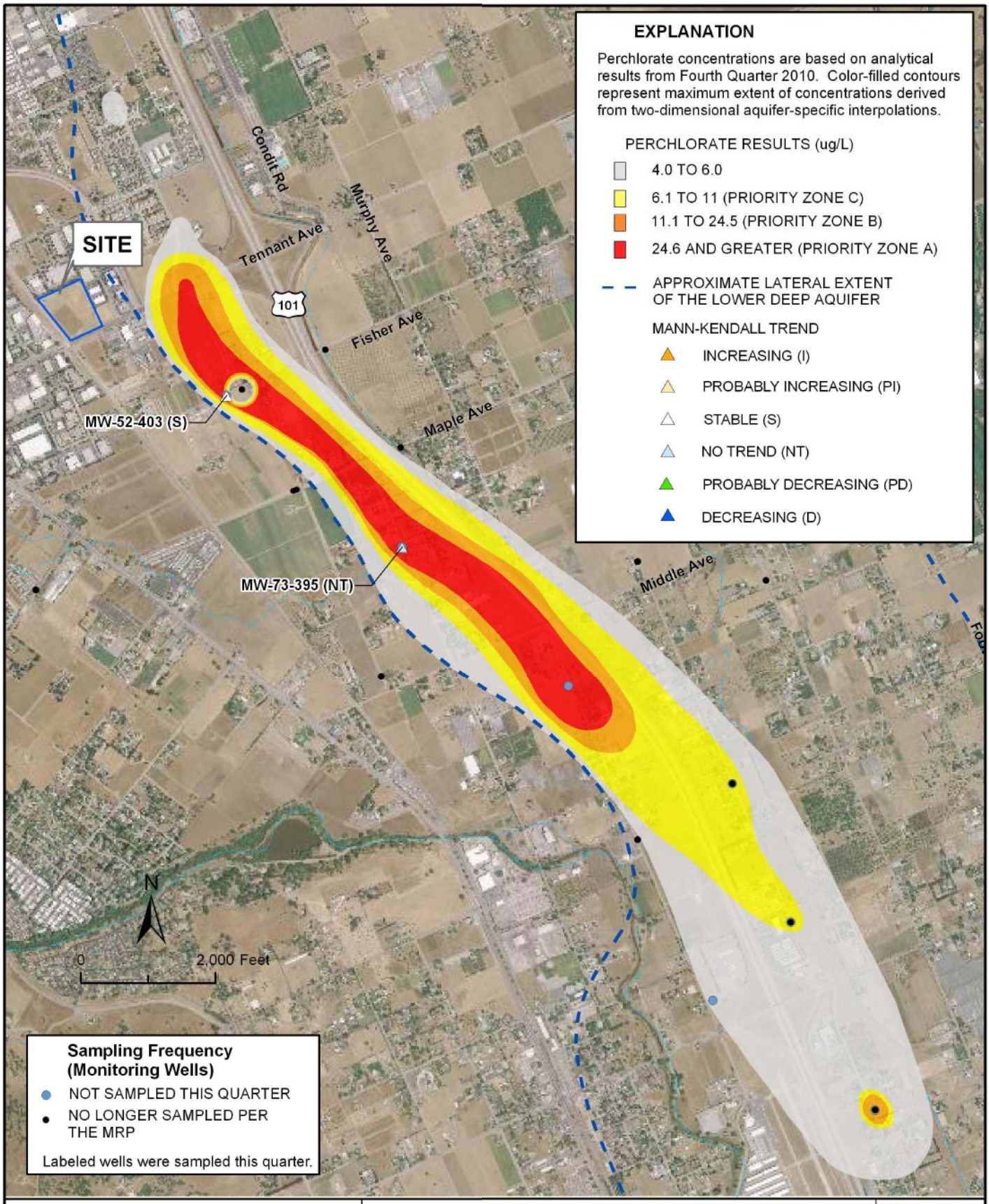

MACTEC

Perchlorate Results - Lower Deep Aquifer
2010 Annual Cleanup Progress Status Report
Olin/Standard Fusee Site
Morgan Hill, California

Figure 5

DRAWN	JOB NUMBER	CHECKED	CHECKED DATE	APPROVED	APPROVED DATE
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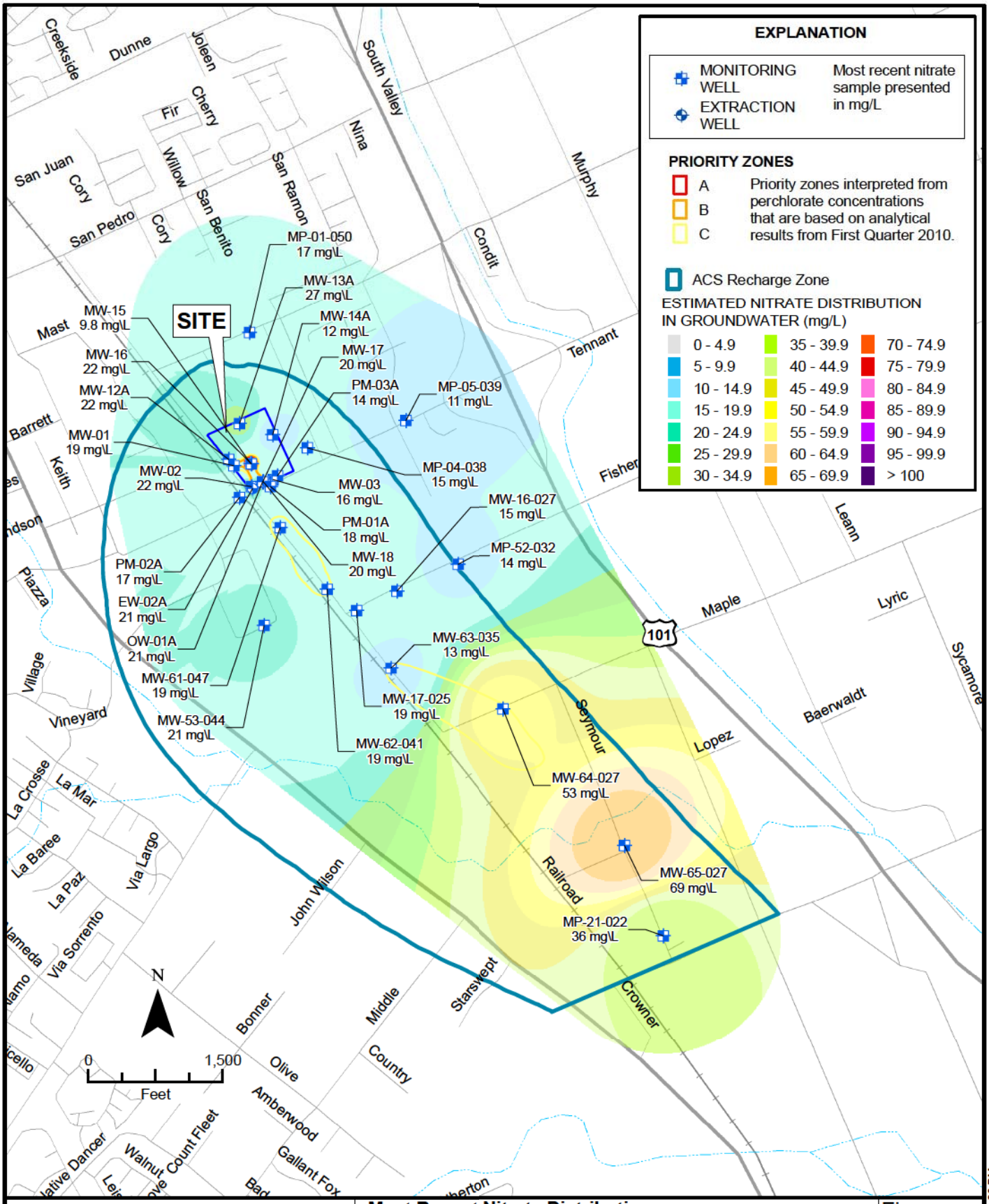

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Most Recent Nitrate Distribution in Shallow Aquifer within the ACS Recharge Zone of Influence
Santa Clara County
Olin/Standard Fusee Site, Morgan Hill, California

Figure 6

DRAWN	JOB NUMBER	CHECKED	CHECKED DATE	APPROVED	APPROVED DATE
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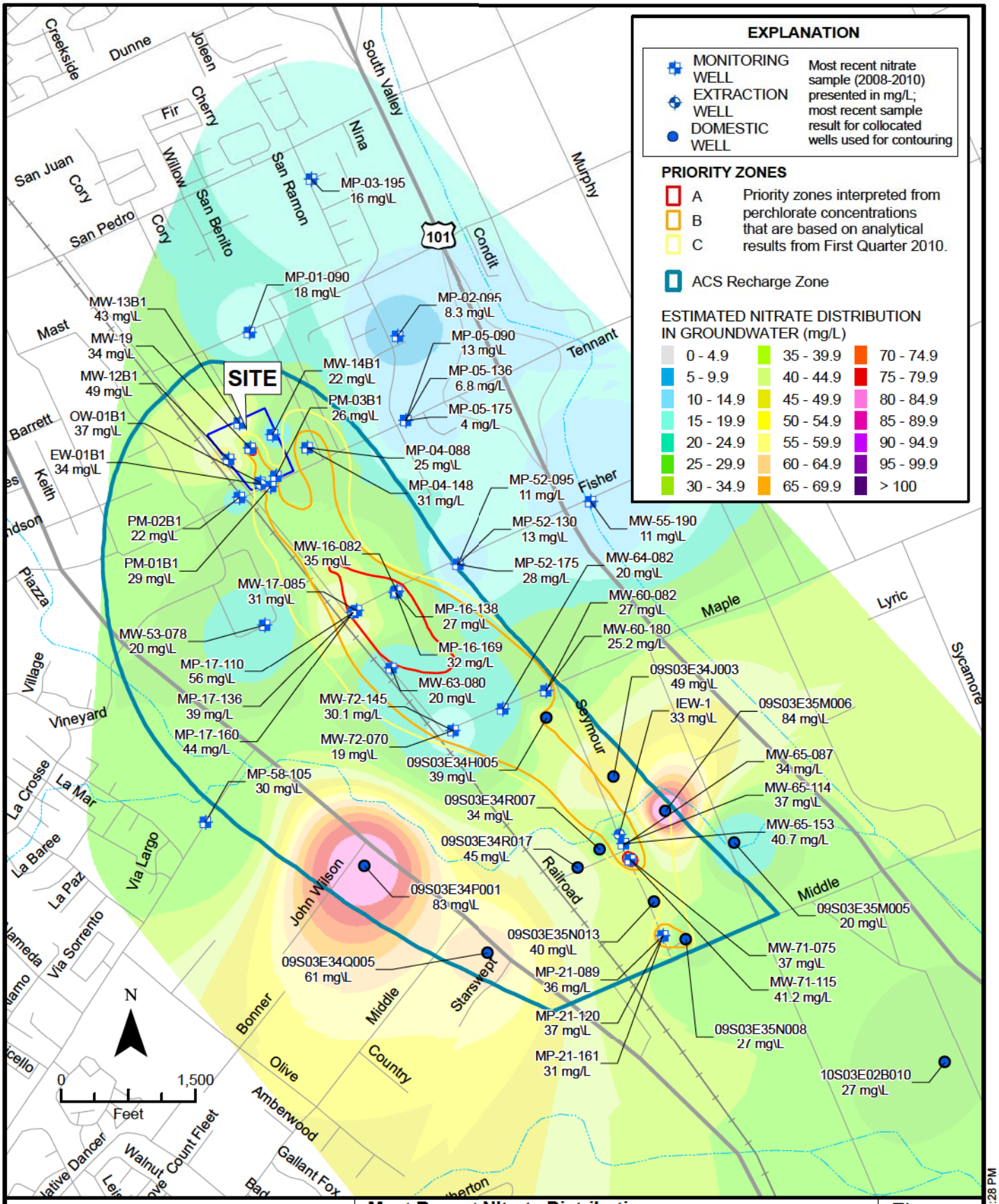

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Most Recent NItrate Distribution in Intermediate Aquifer within the ACS Recharge Zone of Influence
Santa Clara County
Olin/Standard Fusee Site, Morgan Hill, California

Figure 7

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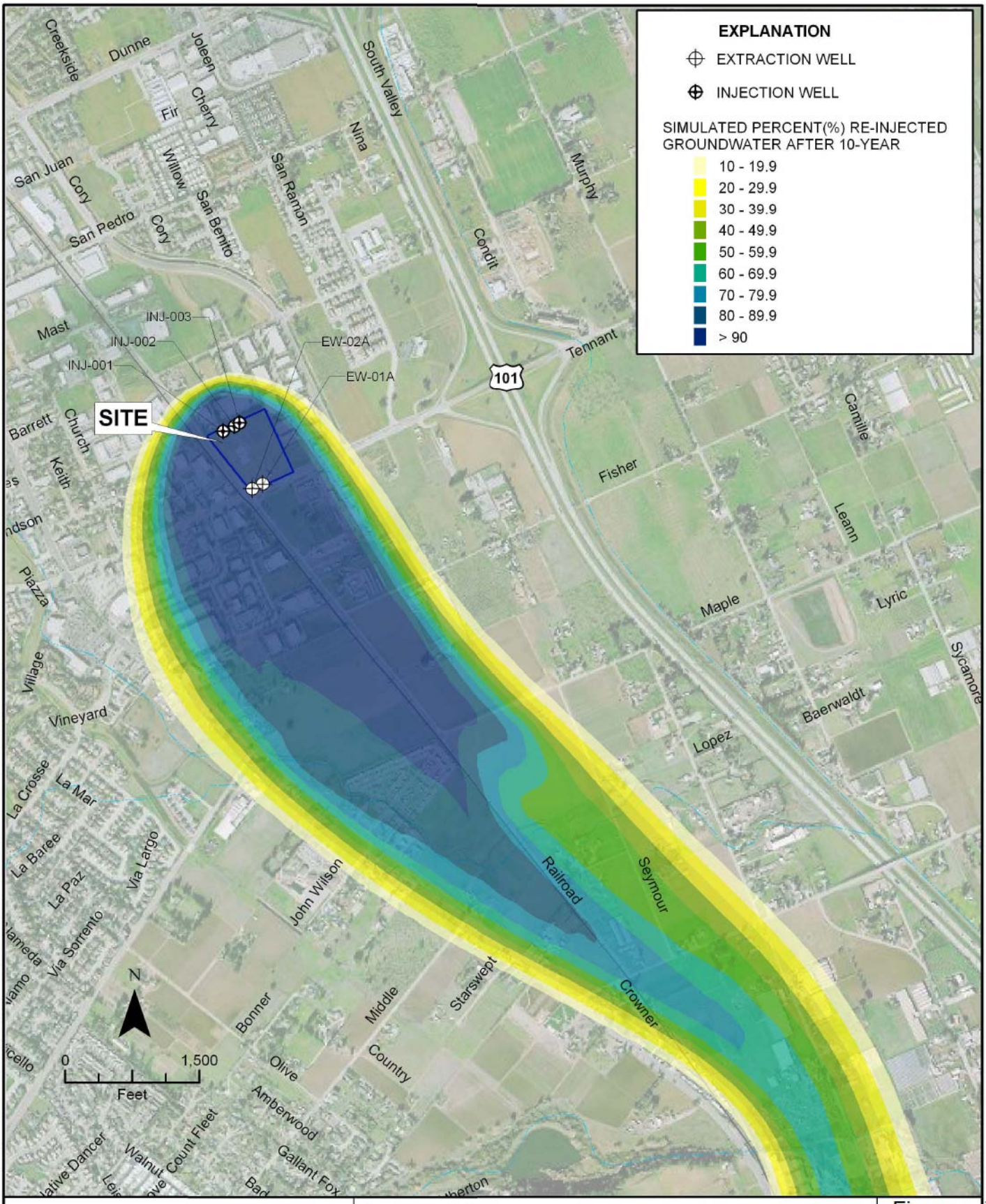

MACTEC

Percent ACS Recharge Water in Shallow Aquifer at 590 GPM Reinjection

Santa Clara County
Olin/Standard Fusee Site, Morgan Hill, California

Figure 8

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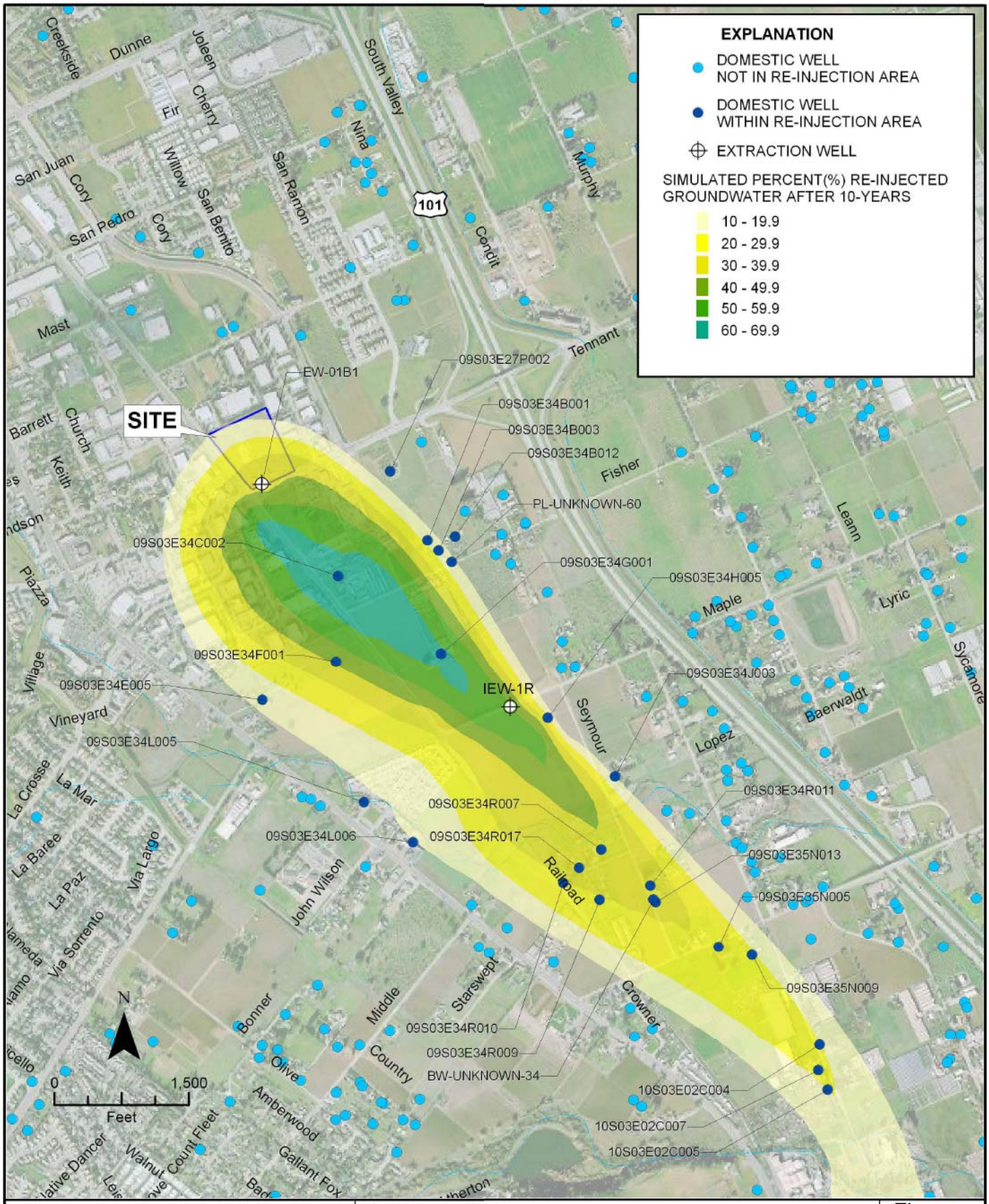

MACTEC

Percent ACS Recharge Water in Upper Intermediate Aquifer at 590 GPM Reinjection

Santa Clara County
Olin/Standard Fusee Site, Morgan Hill, California

Figure 9

DRAWN	JOB NUMBER	CHECKED	CHECKED DATE	APPROVED	APPROVED DATE
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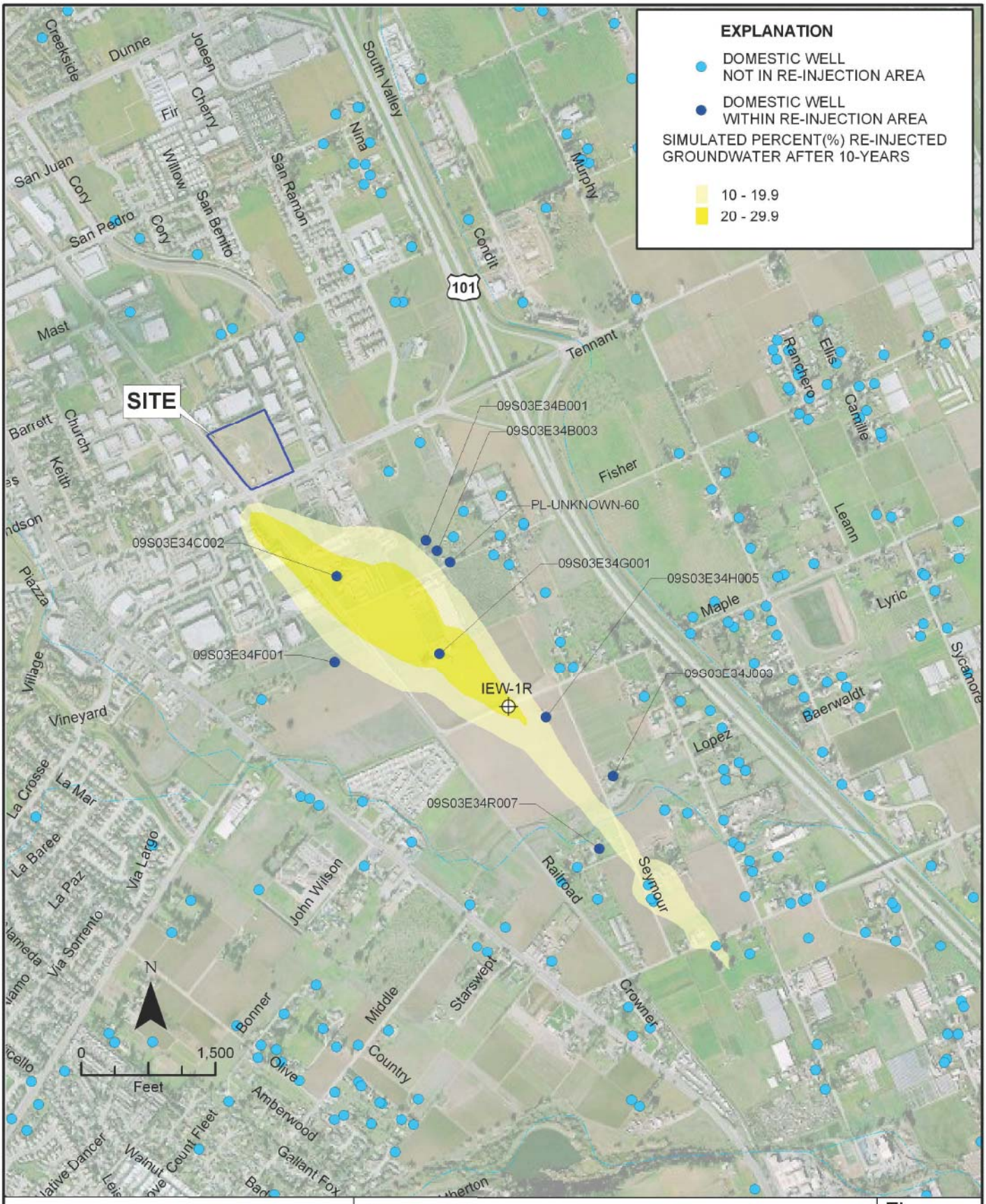

MACTEC

Percent ACS Recharge Water in Middle Intermediate Aquifer at 590 GPM Reinjection

Santa Clara County
Olin/Standard Fusee Site, Morgan Hill, California

Figure 10

DRAWN	JOB NUMBER	CHECKED	CHECKED DATE	APPROVED	APPROVED DATE
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