

**First Five-Year Review Report  
for  
Watkins-Johnson Superfund Site  
Scotts Valley, California**

**September 2002**

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### **Attachments**

- 1 Site Map
- 2 List of Documents Reviewed

## List of Acronyms

ARAR	Applicable or relevant and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSDWA	California Safe Drinking Water Act
EPA/USEPA	United States Environmental Protection Agency
FR	Federal Register
FWPCA	Federal Water Pollution Control Act
H&S Code	California Health and Safety Code
NCP	National Contingency Plan
NPL	Superfund National Priorities List
O&M	Operation and Maintenance
OSC	On Scene Coordinator
OU	Operable unit
OUFS	Operable Unit Feasibility Study
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Responsible Party
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
SVE	Soil Vapor Extraction
TCE	Trichloroethylene
TBC	To Be Considered
VOC	Volatile Organic Compound
WJ	Watkins Johnson

## **Executive Summary**

The Watkins Johnson Superfund Site in Scotts Valley, California, consists of a single operable unit (OU). The remedy for the site included capping to reduce infiltration, groundwater pump and treat, and soil vapor extraction. The Preliminary Closeout Report was signed September 22, 1994. This Superfund Site still remains on the Superfund National Priorities List (NPL).

The assessment of this Five-Year Review found that the remedies were constructed in accordance with the requirements of the Record of Decision (ROD). The remedies are functioning as designed. Because the remedies are protective, this Site is protective of human health and the environment.



**Triggering action:**

- Actual RA Operation of Groundwater Remedial Systems
- Construction Completion
- Other (specify) \_\_\_\_\_
- Actual RA Start at OU# \_\_\_\_\_
- Previous Five-Year Review Report

**Triggering action date:** September 22, 1994

**Due date (five years after triggering action date):** September 22, 1999

**Issues:**

Containment berm at the Groundwater Treatment Facility requires minor repair.

The Soil Vapor Extraction system has nearly met clean-up requirements and will soon be turned off.

**Recommendations and Follow-up Actions:**

Repairs need to be made to the containment berm at the Groundwater Treatment Facility.

WJ should complete VLEACH evaluation of the SVE system to confirm that it has met ROD standards.

**Protectiveness Statement(s):**

The remedy at the Watkins Johnson site is expected to be protective upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

**Other Comments:**

No other comments at this time.

**Watkins Johnson Superfund Site  
Scotts Valley, California  
First Five-Year Review Report**

**I. Introduction**

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review Report pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA), Region IX, conducted the Five-Year Review of the remedy implemented at the Watkins Johnson Superfund Site in Scotts Valley, California. This review was conducted by the On Scene Coordinator (OSC) and other Superfund Staff for the entire site from March to September 2002. The review team prepared this report which documents the results of the Five-Year Review.

This is the 1<sup>st</sup> five-year review for the Watkins Johnson Site. The triggering action for this policy review is the Superfund Preliminary Close Out Report date of September 22, 1994. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

## II. Site Chronology

**Table 1: Chronology of Site Events for the Watkins Johnson Superfund Site**

Event	Date
The plant was first used as a manufacturing site	1960
Site became known as the Stewart Division of the Watkins-Johnson Company	1984
The RWQCB requested that WJC initiate a groundwater monitoring program	April 1983
The Santa Cruz County and the RWQCB inspected the site and found TCE and trichloroethane (TCA) in the wastewater disposal system. TCE had been used at WJC as an industrial solvent	1984
The RWQCB issued Cleanup and Abatement Order requiring WJC To begin clean up activities at the site	May 1984
Construction of an extraction and treatment system began	July 1986
Extraction and treatment system began operation	October 1986
The RI phase was completed with EPA's approval of the final draft of the RI Report	June 1989
EPA issuance of the ROD	June 1990
Site listed on the EPA National Priorities List	August 1990
Special Notice Issued	September 1990
Consent Decree Signed	October, 1991
Construction Completed	August, 1994
Preliminary Close Out Report	September, 1994
Final RA Report	December, 1994
Operational and Functional Period Begins	September, 1995
Final QA Report	September, 1996

## III. Background

The former Watkins Johnson Stewart Division is a 30 acre facility located in Scotts Valley, California. The facility is now owned and operated by the Silicon Valley Group . However, the Watkins Johnson Company still retains the ownership and operation of the clean-up activities at the site. The Watkins Johnson Site is located within Santa Clara County, approximately 5 miles north of the city of Santa Cruz, in a small valley located west of the city of Scotts Valley and southwest of the Santa Cruz Mountains. (Figure 1). This area is considered to be within the California Coastal Ranges and is in close proximity to California's Pacific Ocean coast.

Watkins Johnson Company (WJC), which began operations in 1963, manufactured industrial furnaces, electronic components, and is used as a research facility. On-site industrial processes include metal machining, degreasing operations, metal plating, glass etching, welding, soldering, painting and photo lab activities. A variety of organic and inorganic chemicals have been used at the site. The Santa Margarita aquifer which is comprised of a perched zone in addition to the regional zone is a major source of ground water in the study area.

In April 1983, the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) requested that WJC initiate a groundwater monitoring program. In 1984, prompted by an anonymous phone call, the RWQCB conducted an inspection of the plant's septic system and dilution tanks. The inspection revealed the presence of several industrial solvents used at the plant in the septic system, a dilution tank, and groundwater beneath the site. The Board subsequently issued an order calling for an investigation of the local hydrogeology, a determination of the extent of the groundwater contamination, and the design of an aquifer restoration program. The aquifer restoration program included the excavation of contamination source dilution tank. It culminated in the construction of a groundwater extraction and treatment system that was put into operation in October 1986. The treated water was then used on site, recharged to the perched zone on-site, or discharged to Bean Creek.

In September of 1987, Watkins-Johnson Company began remedial investigation activities under an EPA Administrative Consent Order. The Watkins Johnson Company Remedial Investigation Report was completed on April 28, 1989 by R.L. Stollar & Associates, Inc. The report showed that both soil and ground-water sampling and analyses were regularly done at the site. Approximately 48 soil samples were collected for laboratory analyses from approximately 11 borings during the RI. TCE concentrations of up to 5500 ppb were found in the soil during 1987 and 1988. During a 13-day pilot study of the soil vapor extraction system in May 1989, a significant amount of TCE was removed. One of the main conclusions of the RI was that the chlorinated hydrocarbons had entered both the perched zone and regional zone of the Santa Margarita Aquifer underlying the Site.

The presence of VOC contamination, predominantly TCE, provided the basis for taking action at this site. Hazardous substances that have been released at the site in each media are listed in the table below:

**Table 2: Contaminants**

Contaminant	Affected Media
Trichloroethylene, vinyl chloride, tetrachloroethylene, 1,1-dichloroethylene, 1,1-dichloroethane, 1,4-dichlorobenzene, cis-1,2-dichloroethylene, methylene chloride, chloroform, 1,1,2-trichloroethane, 1,1,1-trichloroethane and silver	Groundwater, Vadose Zone, Soil

The primary contaminant of concern for this site is Trichloroethylene (TCE) and its degradation components. The principal threat posed by these substances is from contamination of groundwater that is or may be used for drinking water. TCE and related VOCs are considered possible and/or probable human carcinogens. Their introduction into

drinking water supplies could present significant health risks to exposed human populations. To the extent the soil remains undisturbed with direct exposure prevented, no health-based risks were identified for existing on-site soil contamination.

#### **IV. Remedial Actions**

The July 9, 1990 Record of Decision presented the selected remedy for the site. EPA and Watkins-Johnson negotiated a Consent Decree for the implementation of the RD/RA, which was entered by the court on October 31, 1991. The major components of the selected remedy were designed to:

- Prevent off-site migration of contaminants within the perched zone by using infiltration leachfields (also referred to as perched zone recharge galleries).
- Transfer contaminated groundwater within the perched zone to the regional zone for more efficient extraction by means of gravity drains;
- Capture and extract contaminated groundwater within the regional zone by using extraction wells, four of which are currently operating on-site;
- Treat extracted groundwater by using an existing granular activated carbon adsorption system;
- Remove soil contamination from the vadose zone by using a soil vapor extraction system; and
- Minimize the potential for mobilization of soil contamination into the groundwater by installing an impermeable cap over the area of concern.

The selected remedy addresses the principal threat by capturing and removing contaminated groundwater and treating it to health-based levels. Soils are to be remedied to a level that no longer poses a treat to groundwater quality.

As discussed earlier, in response to the order from the RWQCB, a groundwater extraction, treatment, and infiltration system was constructed and has been in operation at the Site since 1986. The Remedial Construction undertaken in 1994 comprised the addition of a soil vapor extraction and treatment system and changes to the existing groundwater system, including installation of six perched zone extraction wells (five of which had previously been the perched zone drain wells) and seven perched zone infiltration wells.

Remedial construction was separated into two main programs: the Well Drilling and Abandonment Program, and the Remedial System Construction Program. A separate program was undertaken to install a new gravity sewer system and sewage lift station to replace the system that was installed in 1988. The sewer system installation was performed concurrent with the Remedial System Construction Program.

The Well Drilling And Abandonment Program began on April 4, 1994 and was completed on May 6, 1994. Prior to that, in November 1993, three wells were installed at the eastern side of the Site in order to verify the location of the perched zone aquitard prior to commencing Remedial Construction. Two of the western wells and the eastern well were also converted into infiltration wells during the remedial system construction program.

The Remedial System Construction Program began on June 1, 1994 and was completed on September 30, 1994. Construction began with trenching for piping and utilities from the groundwater and soil vapor extraction and infiltration wells (located in the upper parking lot) to the two treatment areas: the groundwater treatment system located at the northwest corner of the upper parking lot and the soil vapor treatment system located in the lower parking lot. Concurrent with trenching was the placement of the concrete equipment pad for the soil vapor system. Installation and connection of the groundwater and soil vapor equipment occurred in July and August. An extension to the original completion date of July 15 was given by the USEPA due to late deliveries of some critical equipment. The new completion date was August 8, 1994. Startup of the new groundwater extraction and infiltration wells occurred during the last week of July. The soil vapor extraction system was completely tested on August 5, 1994 and again on August 9 at the Pre-Final inspection conducted by USEPA. A punch list of items to be completed was generated during the Pre-Final Inspection. Completion dates were established for each item on the list. All completion dates were met for those items scheduled for completion by September 30. Prior to final cleanup of the Site, the trenched areas within the parking lot were repaved to provide an impermeable cap, in conformance with the ROD.

Operation and Maintenance activities at the site include the performance of regular inspections of both the groundwater treatment system as well as the soil vapor extraction and treatment system. Granular activated carbon change-outs are scheduled as a function of monitoring data from each treatment system. In order to monitor the performance of both systems, quarterly, semi-annual, and annual monitoring samples are collected from both groundwater and SVE monitoring networks.

Annual O&M costs were originally estimated in the ROD to be \$167,820 per year. Actual O&M costs have generally been less than that amount.

In general, both the SVE system and the GW treatment system have been very effective in removing contamination at the site. Only a few of the GW monitoring wells occasionally exceed the ROD treatment standards - Maximum Contaminant Levels (MCLs). Groundwater extraction well concentrations have not exceeded MCLs for several years now. In addition, the soil vapor extraction system is close to meeting its ROD defined goal of reducing soil contamination to a level that will not impact groundwater. To this end, the ROD prescribed VLEACH as the model to be used in assuring that the vadose zone protectiveness standard is met. The RP's contractor anticipates that VLEACH modeling from this quarter will provide the foundation for the SVE system to be turned off and for the compliance monitoring phase of this portion of the remedy to begin.

## V. Five-Year Review Process

The Technical Review Team consisted of Kathryn Lawrence (OSC) and Leslie Owyang-Chin. This Five-Year Review consisted of a review of relevant documents (see Attachment 2). Applicable or relevant and appropriate requirements (ARARs) were also reviewed to determine if any regulatory changes had occurred since the ROD that would impact the protectiveness of the remedy.

In addition, a site inspection was performed at the Watkins Johnson Superfund Site by EPA on August 14, 2002. Interviews with on-site staff and contractors were conducted at that time. The results of that inspection indicated that the remedy was performing effectively.

## VI. Technical Assessment

### Question A: Is the remedy functioning as intended by the decision documents?

The site inspection and review of documents, ARARs, and risk assumptions indicates that the remedy is functioning as intended by the ROD. The Watkins Johnson OU is achieving the remedial objectives of reducing VOC contamination in the vadose zone as well as the perched and regional aquifers.

Operation and maintenance of the treatment systems have, on the whole, been effective. There were no opportunities for system optimization observed during this review. Operation and maintenance activities are consistent with continued pump and treat and SVE operational needs. The treatment systems appear to be in good working order and the facility is secured by a fence and guarded entry. The only outstanding maintenance issue of note was minor damage to the containment berm at the groundwater treatment unit.

### Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Yes, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection are still valid.

**Table 3a - Changes in Chemical-Specific Standards excerpted from ROD - VOCs**

Contaminant	Media	Cleanup Level	Previous Standard/ Requirement	Citation	New Standard/ Requirement	Significance of Changes
Chloroform	GW	MCL	100 ug/l	SDWA, CSDWA	None	None
1,2-dichlorobenzene	GW	MCL	600 ug/l	SDWA, CSDWA	None	None
1,4-dichlorobenzene	GW	MCL	5 ug/l	SDWA, CSDWA	None	None
1,1-dichloroethane	GW	MCL	5 ug/l	SDWA, CSDWA	None	None
1,1-dichloroethylene	GW	MCL	6 ug/l	SDWA, CSDWA	None	None
Cis-1,1-dichloroethylene	GW	MCL	6 ug/l	SDWA, CSDWA	None	None
Methylene Chloride	GW	MCL	5 ug/l	SDWA, CSDWA	None	None
Tetrachloroethylene	GW	MCL	5 ug/l	SDWA, CSDWA	None	None
1,1,1 Trichloroethane	GW	MCL	200ug/l	SDWA, CSDWA	None	None
1,1,2 Trichloroethane	GW	MCL	32ug/l	SDWA, CSDWA	None	None
Trichloroethylene	GW	MCL	5ug/l	SDWA, CSDWA	None	None
Vinyl Chloride	GW	MCL	0.5 ug/l	SDWA, CSDWA	None	None

SDWA = Safe Drinking Water Act  
CSDWA = California Safe Drinking Water Act

**Table 3a - Changes in Chemical-Specific Standards excerpted from ROD - Metals**

Contaminant	Media	Cleanup Level	Previous Standard/ Requirement	Citation	New Standard/ Requirement	Significance of Changes
Arsenic	GW	MCL	50 ug/l	SDWA, CSDWA	10 ug/l*	None
Barium	GW	MCL	1000 ug/l	SDWA, CSDWA	None	None
Cadmium	GW	MCL	5 ug/l	SDWA, CSDWA	None	None
Chromium	GW	MCL	50 ug/l	SDWA, CSDWA	None	None
Copper	GW	MCL	1300 ug/l	SDWA, CSDWA	None	None
Lead	GW	MCL	5 ug/l	SDWA, CSDWA	None	None
Mercury	GW	MCL	2 ug/l	SDWA, CSDWA	None	None
Nickel	GW	MCL	100 ug/l	SDWA, CSDWA	None	None
Silver	GW	MCL	50 ug/l	SDWA, CSDWA	None	None
Vanadium	GW	MCL	--- ug/l	SDWA, CSDWA	None	None
Zinc	GW	MCL	5000 ug/l	SDWA, CSDWA	None	None

SDWA = Safe Drinking Water Act  
 CSDWA = California Safe Drinking Water Act  
 \* the new Arsenic MCL does not take affect until 2004

**Table 4 - Changes in Action-Specific Requirements**

Action	Previous Requirement	Citation/Year	New Requirement	Significance of Changes
None				

**Table 5 - Changes in Location-Specific Requirements**

Location	Previous Requirement	Citation/Year	New Requirement	Significance of Changes
None				

No significant revisions to the standards have been made that affect the protectiveness of the remedy.

No new standards have been promulgated that affect the protectiveness of the remedy.

No significant revisions have been made to To Be Considereds (TBCs) that affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No weather- or seismic-related events have affected the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the documents and data reviewed, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the OU that would affect the protectiveness of the remedy. There have been no changes in the standards that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

**VII. Issues**

**Table 6 – Issues**

<b>Issue</b>	<b>Currently Affects Protectiveness (Y/N)</b>	<b>Affects Future Protectiveness (Y/N)</b>
Minor Containment Berm Damage at Groundwater Treatment Unit	N	N

**VIII. Recommendations and Follow-up Actions**

**Table 7 – Recommendations and Follow-up**

<b>Issue</b>	<b>Recommendations / Follow-up Actions</b>	<b>Party Responsible</b>	<b>Oversight Agency</b>	<b>Milestone Date</b>	<b>Affects Protectiveness? (Y/N)</b>	
					<b>Current</b>	<b>Future</b>
Containment Berm Damage at Groundwater Treatment Unit	Repair Berm	Watkins Johnson	EPA	Complete by Fall 2002	N	N

**IX. Protectiveness Statement**

All threats at the Watkins Johnson Superfund Site are being addressed by the continued operation of the groundwater pump and treatment system as well as the soil vapor extraction system. The remedy at the Watkins Johnson site is expected to be protective upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

**X. Next Review**

The next Five-Year Review for Watkins Johnson Superfund Site is required by September 2007, five years from the date of this review.

## **ATTACHMENTS**

**ATTACHMENT 1**  
**Watkins Johnson Location Map**



**ATTACHMENT 2**  
**List of Documents Reviewed**

## **ATTACHMENT 2**

Watkins Johnson Remedial Investigation Report

Watkins Johnson NPL Site Record of Decision

Superfund Preliminary Closeout Report for the Watkins Johnson Superfund Site

Watkins Johnson Final Quality Assurance Report

