

FY2010 Appropriations Request Form

Office of Congresswoman Jackie Speier
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Washington, D.C. 20515
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Website: www.speier.house.gov

Individuals/Organizations must respond to all questions on the form. Incomplete proposals will not be considered.

All requests will be evaluated before the 12th Congressional District's Citizens Oversight Panel. Appointments to appear before the panel must be made through Cookab Hashemi, chief of staff, at 202/225-3531 or Cookab.Hashemi@mail.house.gov. The panel will convene on the following days; Saturday, March 7, Friday, March 13 and Friday, March 20, 2009. All proposals must be submitted by March 2, 2009.

Date Submitted: February 27, 2009

Project Name: Clean Water for All

Individual/Organization: *(Is the grantee located in the 12th Congressional District?)*

Yes, Sylvan Source, Inc. is in the 12th Congressional District. Our address is:
1509 Industrial Road, San Carlos, CA 94070

Amount Requested *(if requesting report language, please attach.):*

\$6.42 million for demonstrating industrial prototypes offering significant cost and performance advantages in desalination and water treatment for military, industrial, and municipal applications. The program we propose includes a development period of about 1.5 years to scale up from 50 gallons per day (GPD) up to one thousand GPD, thus addressing most current uncertainties in all the relevant market segments mentioned above.

Appropriations Bill/Account/Relevant Authorization law/bill/status *(e.g., "Public Law 107-111"; "FY2008 DOD Authorization", "Currently pursuing authorization through Agriculture Committee", "Safe Drinking Water Act" or "Hatch Act"):*

Our water purification technologies are more energy efficient, less wasteful, and more cost competitive than existing water treatment and desalination technologies currently in the marketplace. Relevant Bills in the current 111th Congress include:

Job Creation & Infrastructure	Water from Public Basins	Safe Drinking Water	Future Water Strategy	Desalination
<ul style="list-style-type: none"> • H.R. 1 (Law 111-5) • H.R. 924 • H.R. 1120 	<ul style="list-style-type: none"> • H.R. 38 • H.R.75 • H.R. 76 • H.R.88 • H.R.352 • H.R. 437 • H.R.551 • H.R.922 	<ul style="list-style-type: none"> • H.R. 58 	<ul style="list-style-type: none"> • H.R. 135 • H.R.285 • H.R.383 • H.R.469 • H.R. 567 • H.R.637 • H.R. 700 	<ul style="list-style-type: none"> • H.R. 371 • H.R. 530 • H.R. 88 • H.R. 371

In addition, our technology offers an attractive alternative to bottled water in areas of excessive water contaminants and, thus, is relevant to the Safe Drinking Water Act.

Local Contact *(Please provide full contact information, including any relevant phone extensions, and indicate if there is a separate D.C. contact.):*

Laura Demmons, CEO; office: 650-594-1420, ext. 106; cellular: 650-714-4762
 Dr. Eugene Thiers, CTO; office: 650-594-1420, ext. 105; cellular: 650-280-4000

Organization’s Main Activities. *(Please limit your response to 250 words and indicate whether it is a public, private, non-profit or private for-profit entity.)*

Sylvan Source delivers technically advanced ultra-clean water systems designed for residential and industrial use. Sylvan Source reduces a broader spectrum of contaminants, at higher concentrations, more effectively and consistently than other technologies. Sylvan Source industrial technology delivers the lowest production costs for clean water and can utilize waste heat and renewable energy sources. Founded in 2003, the company is headquartered in San Carlos, California and is privately held. For more information, please visit www.sylvansource.com.

Please show main items in the project and total cost in a simplified chart form. (Please include the amount of any Federal/State/Local/Private funds, including any in-kind resources.)

50 & 1K GPD Systems

Project Timeline	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>	<u>Q5</u>
Headcount	10	19	21	19	19
Salary, Taxes and Benefits	\$ 248	\$ 542	\$ 695	\$ 621	\$ 582
Design Costs	10	25	30	20	10
Testing Costs	-	20	35	40	-
Project Expenses	20	20	20	-	-
Prototypes	15	55	650	450	750
Contingencies & Rework	-	-	50	50	150
Subtotal	\$ 445	\$ 823	\$ 1,644	\$ 1,344	\$ 1,678
Administration & Overhead	92	98	98	98	98
	\$ 537	\$ 921	\$ 1,742	\$ 1,442	\$ 1,776
Cumulative Total	\$ 537	\$ 1,458	\$ 3,199	\$ 4,642	\$ 6,418

Project Description, including a timeline, goals, expected outcomes and specific uses of Federal Funds. (Your response must focus on the requested funds rather than the organization’s mission and general activities. Please limit your response to 250 – 500 words.)

The proposed project is the development of a 1 thousand gallon-per-day desalination system operating from a renewable energy source using a prototype phased approach. Key project phases, milestones, and goals are summarized in the following table*:

Daily Production Rate	6 GPD	50 GPD	1,000 GPD	10,000 GPD	1M GPD
Prototype Intent	Demonstrate core water processing technologies	Demonstrate the large-scale engine is feasible	Demonstrate the large-scale system is feasible	Demonstrate scalability of system	Demonstrate actual deployment of operational system
Prototype Availability	• Now (Jan 2009)	• 6 months from funding	• 10 months from funding	• 14 months from funding	• 24 months from funding
Prototype Configuration and objectives	• Modified M-600 to enable short-term saline feedwater operation	• Integrated degasser/demister to demonstrate full platform configuration operation • Operate from conventional heat source	• Scale up to 1000 GPD and demonstrate use of solar heat source • Demonstrate automated process controls required for large scale systems	• Scale up to 10,000 GPD and collect operational data in solar-desal configuration	• Scale up to 1M GPD • Demonstrate Pilot Run quality prototypes • Demonstrate production-ready processes (manufacturing & support)
Prototype Test Capabilities	• Water quality testing only	• Basic performance parameters • 1 st NSF/ independent testing	• Full performance parameters • NSF/ relevant independent testing	• Full solar-desal performance parameters • Full qualification	• Full qualification tests

		<ul style="list-style-type: none"> • Initial product reliability testing • Initial field testing 	<ul style="list-style-type: none"> • Product reliability • Long-term field testing 	<ul style="list-style-type: none"> • testing (product reliability, operational, long-term reliability) • Training and operations 	
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* Timeline and specific uses of federal funds is included in the previous project timeline chart. Note that funding excludes systems larger than 1,000 GPD.

How will this earmark serve to expand the capacity of your organization and how will your organization sustain this work beyond the federal funding? *(Your response must focus on the impact of the requested funds rather than the organization’s long-term goals.)*

Sylvan Source’s current product is designed for new residential construction, which is currently stalled. However, our core technology can be adapted for industrial and municipal water treatment and desalination with significant cost and performance advantages over competing technologies. The requested earmark will allow us to produce industrial prototypes of up to 1,000 GPD, including desalination that will open up new domestic and international markets leading to commercial sustainability. Most importantly, the requested earmark removes over 85%-90% of scale-up uncertainties for systems of up to one million GPD.

What is the local significance of this project?

Sylvan Source corporate headquarters is San Carlos, CA, with 10 employees. Additional funding will allow the company to increase hiring. Sylvan Source currently uses toll manufacturing facilities in the United States. Most components are presently sourced domestically, and many are locally produced in Northern California. We intend to maintain this practice with larger-scale systems.

How many residents of the 12th CD will benefit from this project? *(i.e. jobs created, services rendered to, how many people, etc.)*

Our business plan anticipates over 100 employees once the company reaches profitability. The residents will benefit from our expansion as we increase employees, provide additional local tax revenue, and support local businesses. We presently employ numerous local suppliers, such as: Lazar Machining, Precision Metal Spinning , Industrial Hardware and Supply, Graingers, UPS, and County Restaurant Supply—all in San Carlos—as well as OSH and FedEx in Redwood City, Steven Engineering and Environmental Microbiology Laboratory in San Bruno and South San Francisco, respectively, plus numerous other local services. In addition, we have contracted with SRI International in Menlo Park for special technical assistance in the past, and will continue to do so in the future.

Moreover, manufacturing requirements for our large-scale systems will involve hundreds of additional local domestic vendors.

List any other organizations or state/local elected officials who have expressed support for the project in writing. *(Please submit copies of support letters along with the proposal.)*

None to date. However, Representative Mike Honda is familiar with our technology.

Does the organization have any other funding requests for this project? *(Federal, State, Local or private pending?)*

Sylvan Source has been entirely funded from private capital sources. In the current economic climate, however, such sources are unable to fund the development of industrial products.

Has the organization previously received Federal funds for this project? *(Please list any funds received [by fiscal year] and briefly describe how those funds were spent.)*

Sylvan Source has never received any Federal funds.

Please attach a list of your organization's staff and board members *(if any).*

Sylvan Source Staff

-Laura Demmons, CEO & Chairman

Former Marketing Manager, Hewlett-Packard Laptop Computer Division. Over 20 years experience in sales, marketing, and executive management at HP, Eastman Kodak, TDC, and startups.

-Eugene Thiers, Ph.D., Co-founder, CTO

Former Senior Director- Technology Commercialization at SRI International. 29 years at SRI in physical sciences and consulting, including 15 years in water and energy technologies. Former professor at Stanford University. Previously taught at Columbia University.

-Gary Lum, VP Operations

17 years management and 26 years product and technology development experience at Ingersoll Rand, PCTEL, C-Cube Microsystems, HP. Created and managed R&D teams and activities for Fortune 100 and startups.

-Bill Deihl, CFO

CPA, MBA. Experience in multiple start-ups. CFO for private and public companies across multiple industries.

-Douglas Thom, Manager R&D

LeapFrog Project Manager/Contractor-Consultant. Led product development activities for this company's next generation pen. Previously, he spent 14 years at Hewlett-Packard in product development positions including Manufacturing Section Manager, R&D Systems Manager, and Project Management/Development Engineer at the Optoelectronics division.

-Lorene Salcido, Director, Marketing

23 years in marketing and strategic direction in High-Tech companies, including Digeo Inc, Sun Microsystems, and ALPS Electric.

- Brian Bayley, Director, Support Services

Over 30 years of experience in manufacturing operations, outsourcing and distribution within the US and overseas. Former Vice-President and general Manager for Metro, SmartTool Technologies, Wedge Innovations, Hewlett-Packard, and others.

-Douglas Karlson, Supply Chain Manager

Doug Karlson has many years' experience as a manufacturing manager at various locations, most recently at Hewlett-Packard, where he worked on components, PCs, and servers, and previously at Boeing as a mechanical engineer.

-Bart Adao, Sales Manager

Adao is a seasoned Business Development Manager having worked in both large and small (start-up) companies across a wide range of technologies before moving into the Clean Tech space to focus on water at Sylvan Source. Bart has worked at Knova Software, Timesys Corporation, Omnicell, ARM Inc., Sun Microsystems, BE Inc, and Motorola.

-Dustin Mathis, Sales Manager

Dustin is a seasoned sales and business development manager. Before joining Sylvan Source, he founded and served as CEO of What's In Store Media, Inc. (WISM), and prior to that had nine years in the out-of-home (OOH) advertising industry. He previously worked in Hollywood Entertainment Corporation, AutoZone, Inc., and Hot Liquid Media.

Board of Directors

-Robert Frankenberg, Chairman, Kinzan

Current chairman of Kinzan, a leading provider of internet services platforms; admitted to Silicon Valley Hall of Fame. Former Chairman and CEO of Novell, the world's largest networking software company. Former Corporate Vice President and Group General Manager, Hewlett-Packard's Personal Information Group.

-Larry Dubois, Ph.D., Senior Vice President and CTO, ATMI, Inc

Former Corporate Vice President and head of the SRI's Physical Sciences Division. Former Director of Defense Sciences Office, DARPA. Author of over 130 publications and holder of multiple U.S. and foreign patents, former Member of Technical Staff, Bell Laboratories.

-Jim Simmons, Managing Partner, Simmons Goodspeed Investment Management

Former entrepreneur-in-residence for Bill Draper, Draper Richards. Former VP Sales and Marketing for Conductus helping to create this company's \$1.3 billion market cap in 2000. Held a wide range of management positions at Hewlett-Packard in wireless semi-conductors and computer businesses.

-Roger Goodspeed, Managing Partner, Simmons Goodspeed Investment Management

28 years with Lehman Brothers, former Managing Director and Chief Administrative Officer for the M&A Dept. Chairman of Citizens Lehman Power until it was sold in 1996 and became Citizens Power. Board of Directors of Citizens Power and Peabody Energy.

Please attach any additional relevant materials.

The Sylvan Source system is a thermal-based desalination and water treatment process that offers several differentiating features:

- Patent-pending purification and desalination technology
 - Only system known to address all five categories of water contaminants
 - Able to handle highly contaminated feedwater, >100,000 ppm TDS
 - Core technology proven and certified in residential product
 - All system technologies proven in commercial applications
- Lowest maintenance and operating cost
 - No membranes or heat exchangers
 - Reduced energy requirements
 - Small footprint, compact design
 - Factory assembled modules reduce installation time and cost
 - Self-cleaning components, less susceptible to scale
- Energy flexible—can utilize any heat source, including waste heat and solar
- Carbon neutral in waste heat and solar configurations
- Smallest waste stream, waste product is reclaimable and recyclable

When compared with other water-treatment technologies (including desalination), Sylvan Source offers several distinct advantages:

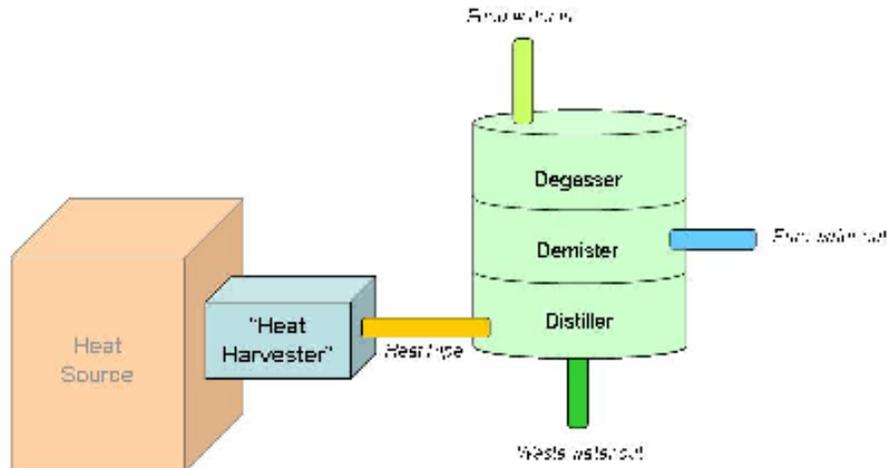
	<i>Sylvan Source</i>	<i>Thermal Distillation</i>	<i>Reverse-Osmosis</i>
Typical time to deployment	6 months ¹	18-24 months	12-18 months
Production Cost (\$/K-gal) ²	\$1.75	\$2.30-\$2.64	\$4.27
Product water quality	Highest	Medium	Lower (acceptable)
Maximum feedwater concentration	Up to 200K ppm	Up to 50K ppm	Up to 35K ppm
Tolerance to feedwater quality variation	High	Medium	Low
Required pretreatment	Low, for scaling	Extensive for scaling	Very extensive, for particulates, oxidants, THMs, organics
Ability to utilize available heat, including waste heat	Yes, wide range	Yes, but limited	No
Maintenance Requirements	Very Low	Medium-High	High
Maintenance staff skills	Low	High	High
Footprint (physical)	Small	Large	Medium
Waste discharge	Smallest waste stream	Larger waste stream	Larger waste stream

1. For production systems

2. Production cost for 100 GPD desalination system utilizing waste heat

These advantages have been independently validated by Anthony Pavone, a Professor at the Chemical Engineering Department of Stanford University, who specializes in the design and construction of large-scale chemical and petro-chemical plants,

A block diagram of the basic Sylvan Source desalination unit is:

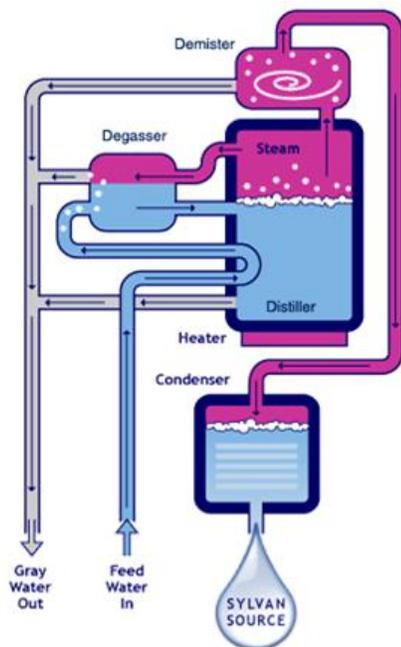


The core water purification is comprised of distilling, degassing, and demisting technologies. Additional technologies are incorporated in the core that improve descaling performance and reduce maintenance requirements. By utilizing heat pipes, the “heat harvester” is able to extract heat from a wider range of available sources than competing desalination and water treatment solutions.

Sylvan Source Technologies

Water Purification

Key Sylvan Source technologies for the purification of water include degassing, distillation, and demisting. While each of these technologies has been used



extensively in water-related industries for many years, Sylvan Source has been able to integrate the three into a simple and reproducible system focused on water purification. The system is designed specifically to simultaneously address the contaminant reduction requirements of total dissolved solids (TDS), volatile organic compounds (VOCs), and microbiological organisms, with minimum maintenance or user intervention.

The distillation process performs multiple functions in the Sylvan Source system; the most obvious one is the production of steam. During the evaporation process dissolved solids from the influent remain in the liquid phase of the water where they are concentrated and are also periodically flushed from the boiler. The final function that occurs in the boiler is the destruction of microbiological elements such as bacteria, viruses and other organisms. This process is simply a function of time and temperature in a boiling water environment.

Degassing, or steam stripping, is a process used to cause the migration of contaminants across a concentration gradient, in this case from 99°C water containing VOCs into a stream of clean steam. The first step is to preheat the contaminated influent to just below the boiling point prior to entering the top of the degasser column. This keeps the steam stripping process at the just below the boiling point over the entire length of the column.

Demisting is the process of separating pure steam from entrained liquid water droplets and boiler splash that naturally occurs in all boilers. The separation process involves a cyclone or series of mechanical barriers and traps which force splash and condensation to be collected near the steam exit and fall back into the boiling liquid. The entrained water droplets are separated from the steam by forcing the mixture to flow at high velocity around a series of corners. The water droplets being much denser have much greater momentum and simply cannot negotiate the turns and are necessarily separated, allowing only pure steam to exit the demister.

These core technologies were introduced with the Sylvan Source M-600 ultra-clean water appliance for the residential market, which met the NSF International Standard 62 for Drinking Water Treatment Units, and are utilized in the desalination system.

Key Sylvan Source Advantages

By incorporating the above key technologies with other proprietary know-how, Sylvan Source offers several key advantages for military, industrial, and municipal applications:

Handling of Highly Contaminated Feedwater

Sylvan Source successfully processes high salinity feedwater from brine aquifers, shallow surface bodies, inland seas, and oil & gas production by:

- Improved descaling pretreatment
 - Incorporates advanced technology to precipitate scale as soft suspension
 - Reduces hard scale buildup in subsequent water processing stages
- Improved heat transfer between water processing stages

- Utilizes sealed heat pipes less susceptible to fouling than heat exchangers
- Incorporates self-cleaning mechanisms to reduce maintenance requirements
- Improved waste water management
 - Permits salt concentrations up to 250K ppm, 99° C
 - Can be handled as a brine slurry
 - Substantially reduced waste water volume
- Not utilizing filtration or membranes that can foul

Flexible Energy Use

Sylvan Source enables desalination over a wider range of conditions by:

- Utilizing heat from a wide range of sources, including:
 - Conventional: Coal, oil, gas, electric
 - Renewable: Solar, Wind
 - Sustainable: Geothermal
 - Various waste heat sources
- Being inherently more thermodynamically efficient than other thermal systems while operating at near atmospheric pressure, eliminating complicated and unreliable vacuum systems.
- Recovering heat more efficiently over a wider range of conditions than other approaches.
- Enabling operation in super-saturated conditions whereas all other systems can only operate in sub-saturated conditions

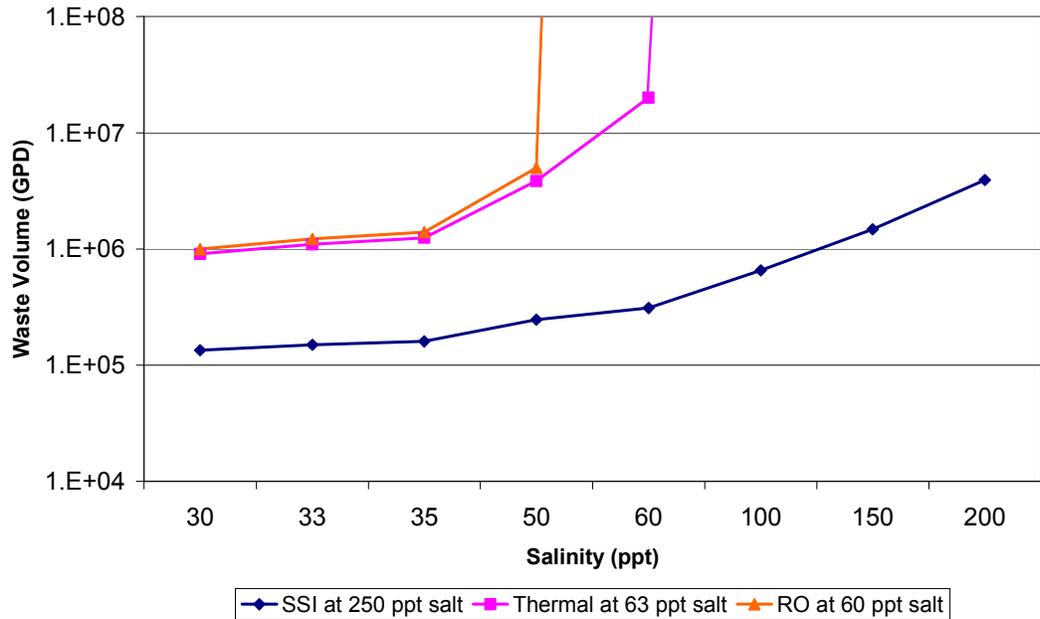
Waste Water Management

Sylvan Source offers improved handling of waste brine:

- Generates lower waste volume than other solutions
 - For a one million GPD plant:
 - MSF plants discharge waste brine up to ~63K ppm
 - RO plants discharge waste brine up to ~60K ppm
 - Sylvan Source discharges waste brine up to ~250K ppm at 99° C
 - Waste volume difference versus other technologies increase significantly with salinity (see chart below)

- Sylvan Source waste brine begins to crystallize as soon as it cools down
 - Waste can be handled as a slurry
 - Waste compounds are valuable and reclaimable/recyclable

Waste Volume vs. Salinity



Advantage in Maintenance Cost

Sylvan Source offers unique advantages in maintenance cost compared with competing desalination technologies:

Maintenance Cost Item	Sylvan Source	Thermal Distillation (MSF, MED, VC)	RO
Membrane replacement	None	None	Yes
Vacuum system	No	Yes	No
High pressure pumps	No	No	Yes
Number of pumps	Fewest (gravity-fed system)	Lots	Lots
Factory assembled modules	Yes	No	No
Physical plant size	Smallest	Large	Medium

Advantage in Maintenance Skill Sets

Sylvan Source offers unique advantages in maintenance cost compared with competing desalination technologies:

Required Maintenance Skill Set	Sylvan Source	Thermal Distillation (MSF, MED, VC)	RO
Membrane Chemist	No	No	Yes
Water Chemist	No	No	Yes
Mechanical Engineer for vacuum operations	No	Yes	No
Rotating Machinery Engineer	No	Yes	Yes

Test Results

Certified Test Results

The core water processing technologies utilized in the Sylvan Source desalination system has been leveraged from the residential M-600 water processing product. The M-600 has been certified by NSF International, is one of only two products to meet the NSF Standard 62, and the only product to ever meet the NSF Standard 62 for perchlorate. A copy of the NSF test report is included in Appendix B.

In addition, NSF International recently completed a series of tests focused on the M-600 degassing capabilities. SRI (Stanford Research Institute) International, an independent, nonprofit research institute, evaluated and recommended 5 contaminants, based on Henry's Law and water solubility, to be used as proxies for contaminants without requiring individual testing.. NSF tested the contaminant reduction capabilities of the Sylvan Source M-600, using the 5 recommended proxies with the following results:

Proxies ¹	Influent Concentration (ug/L)	Effluent Concentration (ug/L)	Reached non-detectable limit	Actual % Reduction
Carbon Tetrachloride (CCl ₄)	370	0.5	Yes	99.9
Chlorobenzene (CB)	98	0.5	Yes	99.5
Bromo-dichloromethane (BDM)	100	1.8	No	98.2
Trichloroethylene (TCE)	84	0.5	Yes	99.4
Isopropyl Alcohol (IPA)	2000	80	No	96.0

1. These are proxies developed by SRI International and validated by NSF International to represent thousands of chemicals in the volatile gases and liquids category.

Internal Test Results

While the M-600 is only designed for potable water applications, Sylvan Source has performed internal testing on M-600 units modified to minimize salt and scale buildup. While the modifications are only suitable for demonstration purposes, the following internal test results validate the effectiveness of the core Sylvan Source water purification technologies:

Feedwater	Test Result (Product Water, ppm TDS)
Seawater (San Francisco Bay, 33K ppm TDS)	12 ppm
Enhanced seawater (SF Bay with NaCl added to total 90K ppm TDS)	26 ppm
Concentrated seawater (SF Bay, reduced to 58K ppm TDS)	28 ppm
Concentrated seawater (SF Bay, reduced to 117K ppm TDS)	42 ppm

Independent Economic Evaluation

An independent analysis of the Sylvan Source Desalination System has been performed by Professor Anthony Pavone (Department of Chemical Engineering, Stanford University) evaluating the Sylvan Source Desalination System applied to seawater. A summary of Professor Pavone's conclusions is reproduced below.

Production Cost (\$/K-gal) for 1M GPD plant (municipal):

Operating Assumption Model	Sylvan Source	MSF distillation	MED/VC distillation	RO membrane
Waste Heat Utilization—Standard in the Middle East	\$1.75	\$2.32	\$2.64	\$4.27
Other Industrial Conditions—Stand alone	\$3.65	\$4.57	\$4.89	\$4.27