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MARCIE L. EDWARDS General Manager

June 27, 2016

The Honorable City Council c/o Office of the City Clerk Room 395, City Hall Mail Stop 160

Attention: Councilmember Felipe Fuentes Chair, Energy and Environment Committee

Honorable Members:

Subject: Council File No. 14-0338-S1 - Approaches and Technologies That May Benefit the San Fernando Groundwater Aquifer Remediation Efforts and the Los Angeles – Eilat Innovation and Cooperation Task Force Collaboration

This is in response to Motion (Blumenfield-Ryu) requesting LADWP to review and report to the Council various approaches/technologies that may benefit the San Fernando groundwater aquifer remediation effort in a cost effective manner, such as the In-Situ soil treatment approach utilized by the Israeli company, Natyfit; and other firms and techniques.

Cleaning-up and protecting the local groundwater aquifer is critical for the City of Los Angeles (City) to develop sustainable, long term water supplies. In the 2015 Urban Water Management Plan, which is the Los Angeles Department of Water and Power's (LADWP) strategic planning document for long-term water supplies, LADWP has committed to restoring its annual, local groundwater production by the year 2025. This will be accomplished through remediation of San Fernando Basin contamination and augmenting Basin pumping with groundwater replenishment and additional stormwater capture. Further, the Mayor's Sustainable City pLAn sets a goal for the City to reduce purchased imported water supplies by 50 percent by 2025, which will require new groundwater remediation facilities to be designed and constructed in a timely, cost-effective manner.

For clarity, this report is organized into five sections: Contaminant Source Control Sites, Remediation of LADWP Groundwater Production Well Fields, Emerging Technologies The Honorable City Council Page 2 June 27, 2016

and Pilot Studies, Research Partners and Opportunities, and the Los Angeles – Eilat Innovation and Cooperation Task Force.

Contaminant Source Control Sites

The administrative and enforcement agencies for source control sites are typically the Los Angeles Regional Water Quality Control Board (Regional Water Board) and the California Department of Toxic Substances Control (DTSC). Responsible parties named in clean-up orders or actions are responsible for the design, construction, and operation of the actual remediation projects. LADWP may provide technical review of remediation work plans submitted to both the Regional Water Board and DTSC, but LADWP does not select which treatment technology is ultimately used. A listing of active source remediation sites is shown in Attachment No. 1.

The best way LADWP can facilitate innovation and research in this area is to introduce the developers of treatment technologies to source control site managers. LADWP's participation in clean tech forums such as the Los Angeles Cleantech Incubator (LACI), the Metropolitan Water District of Southern California's (MWD) TECHHUB Innovation and Technology Program, and the Los Angeles-Israel Task Force all assist LADWP in making these introductions. In support of projects that provide mutual benefit, LADWP can provide assistance with obtaining monitoring well data that may be relevant to the project's sites, and can offer advice or assistance with the permit approval process at the Regional Water Board.

Remediation of LADWP Groundwater Production Well Fields

LADWP is taking the lead in developing basin-wide remediation of its groundwater production well fields, except for United States Environmental Protection Agency (USEPA) Superfund projects. A comprehensive assessment of groundwater quality in the San Fernando Basin was completed in 2015 by LADWP's 2009-15 Groundwater System Improvement Study, which identified primary contaminants for each well field (see Attachment No. 2). LADWP is in the process of developing basin-wide groundwater remediation facilities for these primary contaminants. Currently, basin-wide facilities are planned at three well field locations: Tujunga, North Hollywood West, and North Hollywood Central. As a requirement by the State Water Resources Control Board Division of Drinking Water (CA-DDW), LADWP is focusing on best available treatment technologies for the design of these groundwater remediation facilities. Further, this approach is needed to meet critical deadlines for eligibility of California State Proposition 1 bond funding, as well as to meet local supply goals set forth in Mayor' Executive Directive No. 5.

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Best available technologies (BAT) currently being evaluated by LADWP for the San Fernando basin-wide remediation facilities are shown in the following table:

Viable Technologies Under Evaluation		
Contaminant	CA-DDW BAT	
Volatile Organic Compounds (TCE, PCE, 1,1 DCE, CCl4)	- Aeration Tower - Granular Activated Carbon (GAC)	
Chromium (Total Chromium, Cr-6)	- Ion Exchange Strong-based - Ion Exchange Weak-based	
1,4 Dioxane	- Advanced Oxidation Process (Ultra Violet + Peroxide)* *will not become a BAT until a maximum contaminant level is established.	

Emerging Technologies and Pilot Studies

Beyond basin-wide remediation projects, LADWP is directly and indirectly engaged in various pilot studies aimed at developing alternative technologies that could lower the lifecycle cost of remediation, reduce usage of chemicals or energy, and/or minimize space requirements. The development and regulatory approval of these treatment technologies normally occurs in three steps: (1) bench testing 6 to 12 months, (2) pilot site testing 1 to 2 years, and (3) construction of full-scale permitted facilities 2 to 3 years. The following is a short list of technologies being evaluated by LADWP:

Potentially Viable Technologies Under Evaluation			
Technology/Make	Potential Benefits	Status	
Biotta™ Two-Stage (Aerobic, An-aerobic) Bioremediation	Footprint, cost, chemicals Treat multiple contaminants Volatile Organic Compounds (VOC), Chrome-6 (Cr-6), Perchlorate without separate treatment trains	 Bench scale testing completed with Tujunga well field water in January 2015 Need manufacturer to increase treatment rate capacity by 10 times 	
Microvi	Footprint, cost, chemicals Treat multiple contaminants (VOC, Cr-6, Perchlorate) without separate treatment trains	- Monitor pilot test for nitrate removal at neighboring Sunnyslope water to be online end of 2016	

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Potentially Viable Technologies Under Evaluation (Continued)				
Technology/Make	Potential Benefits	Status		
Aqwise® (biological, fluidized bed reactor)	Remediation of perchlorate contamination with reduced water loss and brine disposal	Monitor new pilot by American States Water in Illinois Need to increase treatment capacity by 10 times and improve perchlorate removal effectiveness		
Xylem Wedeco™ UV- Hypochlorite Remediation	Remediation of 1,4 Dioxane contamination with lower cost chemicals	Partnership with Carollo Eng. and Xylem for bench testing and site pilot test for effectiveness of removing 1,4 Dioxane from NH-West well		
Engineered GAC	Reduce treatment costs by extending the life of GAC in liquid phase GAC treatment vessels	LADWP-Water Research Foundation SM Collaboration Study No. 4492 to test different shape/geometry of GAC		
Soil Aquifer Treatment	Eliminate need for reverse osmosis treatment of recycled water for Groundwater replenishment	LADWP-WRF Collaborated Study No. 4600 to assess effectiveness of San Fernando Basin soils for removing contaminants		

LADWP aims to work closely with CA-DDW and other regulatory entities to evaluate these pilot studies, and to facilitate the approval process for potable water supply projects.

Research Partners and Opportunities

LADWP has engaged the support of other utilities, research agencies, expert consultants, technology incubators, and trade councils to scout for innovative

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technologies for groundwater remediation, as well as other aspects of water utility operations. Some of the organizations currently helping LADWP with innovation studies and research include: Waterworks Management Workshop, Water Research Foundation, American Society of Civil Engineers, Isle Utilities Technology Approval Group, Booky Oren Global Water Technologies Ltd., LA Clean Tech Incubator, MWD's TECHHUB Innovation and Technology Program, Imagine H20, and Japan External Trade Organization. LADWP intends to continue active participation in these organizations to find innovative solutions to meet its strategic priorities, and to provide cost-effective service to its customers.

Los Angeles – Eilat Innovation and Cooperation Task Force

LADWP was requested to participate in a rainwater demonstration project at Milken Community School, in conjunction with the Los Angeles-Eilat Innovation and Cooperation Task Force, to provide insight, technical assistance, peer review and assess the project's feasibility in achieving water savings Citywide. The subject rainwater harvesting project is modeled after successful rainwater harvesting projects in Israel. The Los Angeles-Eilat Task Force seeks to implement similar projects at the Milken Community School to serve the school, and to pioneer new rainwater harvesting technologies in the City of Los Angeles (City). Technologies and possible alternatives under consideration for the school's rainwater harvesting project include rainwater use for irrigation, aquaponics, and toilet flushing.

LADWP has begun collaboration with the school, and has conducted site walkthroughs to evaluate the school's water capture capacity. Based on preliminary analysis, the total rainwater capture potential for the facility's footprint is 2.2 million gallons, or 7 acre-feet of rainwater annually. The captured stormwater could potentially offset the school's potable water use by that amount, and aide the City's ongoing water conservation efforts. LADWP will continue to evaluate and provide recommendations for possible demonstration projects at the school based on its location, topography, and beneficial uses.

One of the options under consideration is the use of rainwater for indoor non-potable use, such as toilet flushing. This alternative is a relatively new concept for local schools, but a common practice in schools in Israel. While the implementation of this system requires design and permitting, LADWP will provide guidance and technical assistance with any permit requirements from regulatory agencies.

This water conservation collaborative will serve as a demonstration project for rainwater collection, storage, and indoor use at schools in the City. LADWP will continue to collaborate with Milken Community School to assist in preparing plans, and reporting on water savings resulting from captured stormwater at the school.

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If you have any questions or if further information, please contact me at (213) 367-1338, or Ms. Winifred J. Yancy, Director of Legislative and Intergovernmental Affairs, at (213) 367-0025.

Sincerely,

Marcie L. Edwards General Manager

JKL:rd Enclosures

c/enc: Councilmember Bob Blumenfield, Vice-Chair, Energy & Environment Committee Councilmember Paul Koretz, Member Councilmember Gilbert A. Cedillo, Member Councilmember Mitch O'Farrell, Member Ms. Maria Espinoza, Legislative Assistant

Ms. Winifred J. Yancy

MOTION

On May 23, 2014, the City Council adopted a Motion (Blumenfield – Buscaino – Fuentes – LaBonge; CF-14-0338) to create the Los Angeles - Eilat Innovation and Cooperation Task Force also known as the LA – Israel Task Force. The purpose of the Task Force is to foster technology development, business development, and educational and research opportunities in clean technology, water resources, solar energy, and the environmental technologies. The Task Force is comprised of the following organizations: Department of Water and Power; Public Works Department; Consul General of Israel; Clean Tech LA; and Israeli and the Los Angeles business community. The Mayor's Office and members of the City Council's Innovation and Technology, Public Works and Energy and Environment Committees also serve on the Task Force.

The Task Force seeks to strengthen and facilitate cooperative initiatives regarding alternative energy, environmental technology, health, food and agriculture and other technology-based industry sectors.

One of the priorities of the Task Force is the remediation of the San Fernando Valley groundwater aquifer which is important in achieving the City's sustainability goals. Remediating the groundwater aquifer will ensure a more reliable and locally-sourced water supply for the City.

A key challenge in this effort is addressing the cost. Remediating the groundwater will likely involve significant capital investment from the City and the ratepayers. To ensure the most cost-effective approaches are utilized in the remediation of the groundwater, the Department of Water and Power should review all viable options.

I THEREFORE MOVE that the Department of Water and Power be requested to review and report to the Council in 60 days on various approaches/technologies that may benefit the San Fernando groundwater aquifer remediation effort in a cost effective manner, such as the In-Situ soil treatment approach utilized by the Israeli company, Natyfit; and other firms and techniques.

PRESENTED BY:

BOB BLUMENFIELD Councilmember, 3rd District

SECONDED BY:

MOTION

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On March 5, 2014, the State of California and the State of Israel entered into a Memorandum of Inderstanding (MOU) to establish a Strategic Partnership of Joint Innovation, Exchanges and Cooperation. The HOU seeks to strengthen and facilitate cooperative initiatives regarding alternative energy, environmental bechnology, health, food and agriculture and other technology based industry sectors.

The City of Los Angeles, in conjunction with its Sister City of Eilat, Israel, is uniquely situated to htther the goals of this cooperative and strategic partnership between California and Israel. Eilat has been a los Angeles Sister City since April 1959 and we share many of the same issues surrounding resources, drought, briewables, clean technologies, and clean water. Both Los Angeles and Eilat are similarly situated & ographically, have an educated work force, incubate innovation at the local level and have much to gain by working together in a manner which has already been advanced at the State level. In that the City of Los Angeles isalready progressing with the development of innovative technologies, collaboration with Eilat is just a smart way of addressing similar environmental and technological issues.

To this end, I am proposing the establishment of a task force, based on our Sister City relationship with Bat, to foster the exchange of ideas, the currency of innovation, between Israeli companies, Southern California bisiness and education community, non-profits and the City of Los Angeles. Such a task force could be comprised of representatives from the following: Department of Water and Power; Department of Public Works; Consul General of Israel; Clean Tech LA; Israeli and Los Angeles business community; Mayor's Office; ard Chairs of City Council Committees on Innovation, Technology and General Services, Public Works and Gung Reduction, and Energy and Environment.

I THEREFORE MOVE that the City Council establish the Los Angeles/Eilat Innovation and Co-Operation Task Force, to be convened to foster technology development, business development, and educational and research opportunities in clean technology, water resources, solar energy, and the environmental technologies with the Task Force initially comprised of representatives from the following organizations: Department of Water and Power; Public Works Department; Consul General of Israel; Clean Tech LA; Israeli and Los Angeles business community; Mayor's Office; and, Chairs of the City Council Committees on Innovation, Technology and General Services, Public Works and Gang Reduction, and Energy and Environment;

I FURTHER MOVE that the Chair of the Task Force be selected by the Task Force city government membership at its initial meeting, and subsequently, the Chair will appoint members of the Los Angeles business community to the Task Force, with Israeli business community members to be selected by the Consul General of Israel; and

I MOVE FURTHER that the Task Force be convened for a period of one year at which time the Chair of the Task Force shall submit a report to the City Council setting forth its findings and recommendations concerning the items under its purview.

PRESENTED BY BOB-BLUMENFIELD Sounci/member, 37 SECONDED BY mar 1 8 2014

MOTION

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The Task force seeks to strengthen and facilitate cooperative initiatives regarding alternative energy, environmental technology, health, food and agriculture and other technology-based industry sectors. Currently the Task Force is developing innovative approaches to increase water conservation and meet the Mayor's sustainability goals.

The Task Force is exploring innovative approaches to reduce potable water use by utilizing rainwater for sanitary purposes. The approach was pioneered in Israel and is now being tested at the Milken School in Los Angeles.

To advance this effort, the Task Force is pursuing a rainwater demonstration project in conjunction with the Milken School. This way, Los Angeles can have a more reliable and locally-sourced water supply.

I THEREFORE MOVE that the Department of Water and Power be requested to participate in the rainwater demonstration project in conjunction with the Los Angeles - Eilat Innovation and Cooperation Task Force by providing insight, technical assistance and peer review; thereby assessing the project's feasibility in achieving water savings City-wide.

PRESENTED BY:

BOB BLUMENFIELD Councilmember, 3rd District

SECONDED BY:

ATTACHMENT NO. 1

Major Remediation Sites in the San Fernando Valley

Site Name	Address	Chemicals of Concern	Remediation
Honeywell / Bendix /	11600 Sherman Way,	chlorinated	Pump groundwater and treat with liquid
Allied Signal	North Hollywood	hydrocarbons	phase GAC and SVE to remove VOCs from soil
		hexavalent	ex-situ groundwater treatment with IX resin
		chromium	and calcium polysulfide injection into soil to
			reduce CrVI to CrIII
		1,4-dioxane	UV photoxidation
Lockheed Plant B1	1705 Victory Pl.,	chlorinated	SVE to remove VOCs from soil. Pump and
	Burbank	hydrocarbons	treat groundwater with GAC (at Burbank OU
		,	treatment plant).
		hexavalent	Excavated 212,000 tons of impacted soil
		chromium	
Lockheed Plant B6	2801 N. Hollywood	chlorinated	Excavated 6,000 tons of contaminated soil.
	Way, Burbank	hydrocarbons	
		metals	
		petroleum	1
		hydrocarbons	
Lockheed Plant C1	10720 Sherman Way,	chlorinated	Excavated 110,000 tons of metal- and VOC-
	Burbank	hydrocarbons	impacted soil.
		metals	
Hewitt Landfill	7361 Laurel Canyon	1,4-dioxane	Planning to pump and treat using synthetic
Landini	Blvd, North Hollywood	i, r alonario	resin to remove 1,4-dioxane, then reinject
	bivu, North Honywood		the treated water.
Home Depot - ITT	1200 S. Flower St.,	chlorinated	SVE + DPE to remove VOCs from the shallow
Aerospace Controls	Burbank	hydrocarbons	vadose zone. Slurry wall for source control.
·····pass sources		hexavalent	ISCR of CrVI to CrIII by injection of calcium
		chromium	polysulfide into soil and groundwater.
		petroleum	Excavated 13,600 cy of soil impacted by
		hydrocarbons	chromium, PCBs, and diesel.
		polychlorinated	
		byphenols (in	
		soils only)	
Courtaulds	5430 San Fernando Rd,	chlorinated	SVE to remove VOCs from soil.
Aerospace / PRC-	Glendale, CA	hydrocarbons	
Desoto		hexavalent	ISCR of CrVI to CrIII by injection of calcium
		chromium	polysulfide and carbon substrate into the
			vadose zone.
Former Excello	4057 Goodwin Ave., Los	chlorinated	SVE to remove VOCs.
Plating Co., Inc.	Angeles	hydrocarbons	
		hexavalent	ISCR of CrVI to CrIII by injection of calcium
		chromium	polysulfide into soil using large diameter
			augers and pressurized injections.

Major Remediation Sites in the San Fernando Valley cont'd

Newlowe Properties	3334-3550 San	chlorinated	SVE to remove VOCs in soil. Pumped over 200
I demower ropercies	Fernando Rd, Los	hydrocarbons	MG of groundwater, treated with GAC, and
	Angeles		discharged to the storm drain. Potassium
			permanganate injected into groundwater to
			treat recalcitrant VOCs. Pilot testing enhanced
		{	anaerobic bioremediation by DHC microbes to
			break down PCE in groundwater.
NEIS Air Treatment	2110 N. San Fernando	chlorinated	SVE and bioventing to remove VOCs.
Facility (Former Profile	Rd, Los Angeles	hydrocarbons	
Plastics)	,	petroleum	Excavated shallow soil contaminated with TPH.
		hydrocarbons	
Former Aerol Co.	3235 San Fernando Rd,	chlorinated	SVE to remove VOCs from the soil; ISCO by
	Los Angeles	hydrocarbons	injection of potassium permanganate in
			groundwater. Note: low permeability vadose
			zone prevents air sparging with SVE and pump
,			and treat.
Former Menasco	100 E. Cedar Ave.,	chlorinated	Pump perched groundwater and treat with
Aerospace	Burbank	hydrocarbons	liquid phase GAC to remove VOCs.
		hexavalent	Ex-site groundwater treatment with IX resin to
		chromium	remove CrVI and in-situ treatment with
			injection calcium polysulfide and molasses to
			promote microbial reduction of CrVI to CrIII
Price Pfister	13500 Paxton St.,	chlorinated	Excavation of shallow contaminated soil, SVE,
	Pacoima	hydrocarbons	and air sparging
		petroleum	Bioventing
		hydrocarbons	
		hexavalent	Enhanced biodegradation by Injecting
		chromium	emulsified vegetable oil into groundwater.
		1,4-dioxane	Considering biodegradation by dioxane-eating
			bacteria and biostimulation using methane in
			groundwater.
Valley Todeco	12975 Bradley Ave.,	chlorinated	SVE
	Sylmar	hydrocarbons	
		hexavalent	ISCR of CrVI to CrIII by injection of calcium
		chromium	polysulfide into soil and groundwater.
Doc Milgrom's	19524 Nordhoff St.,	chlorinated	SVE and ISCO by injection of ozone and
Cleaning Clinic	Northridge	hydrocarbons	hydrogen peroxide into groundwater
Shell #204-1026-0101	181 Alameda Ave. West,	petroleum	SVE
	Burbank	hydrocarbons	

Notes:

SVE = soil vapor extraction

CrVI = hexavalent chromium

Crlli = trivalent chromium

ISCR = in situ chemical reduction

ISCO = in situ chemical oxidation

IX = ion exchange

ATTACHMENT NO. 2

SECTION E

Contaminants of Concern Listed by LADWP Well Field

WELL BLENDING OPERATIONS PLAN

DECEMBER 2015

SECTION E - Contaminants of Concern Listed By Well Field

PRIMARY CONTAMINANTS OF CONCERN

TUJUNGA WELL FIELD

TCE PCE 1,1-DCE 1,4-Dioxane

NORTH HOLLYWOOD WELL FIELD

TCE PCE 1,4-Dioxane

RINALDI TOLUCA WELL FIELD

TCE PCE 1,4-Dioxane

ERWIN WELL FIELD

TCE Nitrate (as N)

WHITNALL WELL FIELD

TCE Iron

VERDUGO WELL FIELD

N/A

MISSION WELL FIELD

TCE

AERATION WELL FIELD

TCE PCE 1,1-DCE 1,4-Dioxane Carbon Tetrachloride Hexavalent Chromium Total Chromium

POLLOCK WELL FIELD

TCE PCE 1,1-DCE 1,4-Dioxane

MANHATTAN WELL FIELD

TCE

BURBANK OU INTERTIE

Hexavalent Chromium Total Chromium 1,4-Dioxane Nitrate (as N) SECTION E

Contaminants of Concern Listed by LADWP Well Field

WELL BLENDING OPERATIONS PLAN

DECEMBER 2015

POTENTIAL CONTAMINANTS OF CONCERN

TUJUNGA WELL FIELD

Trichlorofluoromethane Carbon Tetrachloride 1,2,3-TCP NDMA Perchlorate Nitrate (as N)

NORTH HOLLYWOOD WELL FIELD

1,1-DCE MTBE 1,2,3-TCP TDS

RINALDI TOLUCA WELL FIELD

Perchlorate Iron Manganese

ERWIN WELL FIELD

Iron

WHITNALL WELL FIELD

PCE

VERDUGO WELL FIELD

TCE Carbon Tetrachloride 1,2,3-TCP Manganese

MISSION WELL FIELD

N/A

AERATION WELL FIELD

NDMA Nitrate (as N)

POLLOCK WELL FIELD

1,2,3-TCP Nitrate (as N)

MANHATTAN WELL FIELD

Manganese

BURBANK OU INTERTIE

N/A