UNION SANITARY DISTRICT

Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

BOARD MEETING AGENDA
Monday, February 26, 2018
Regular Meeting - 7:00 P.M.

Union Sanitary District
Administration Building
5072 Benson Road
Union City, CA 94587

Officers
Paul R. Eldredge
General Manager/
District Engineer

Karen W. Murphy
Attorney

	1.	Call to Order.
	2.	Pledge of Allegiance.
	3.	Roll Call.
Motion	4.	Approve Minutes of the Regular Meeting of February 12, 2018.
Information	5.	Balanced Scorecard *(to be reviewed by the Legal/Community Affairs Committee).* a. Second Quarter Fiscal Year 2018 District-wide Balanced Scorecard Measures. b. Balanced Scorecard for the Treatment and Disposal Services Work Group. c. Balanced Scorecard for the Fabrication, Maintenance, and Construction Work Group.
	6.	Written Communications.
	7.	Oral Communications. *The public may provide oral comments at regular and special Board meetings; however, whenever possible, written statements are preferred **(to be received at the Union Sanitary District office at least one working day prior to the meeting)**. This portion of the agenda is where a member of the public may address and ask questions of the Board relating to any matter within the Board's jurisdiction that is not on the agenda. If the subject relates to an agenda item, the speaker should address the Board at the time the item is considered. Oral comments are limited to three minutes per individuals, with a maximum of 30 minutes per subject. Speaker's cards will be available in the Boardroom and are to be completed prior to discussion.*
Motion	8.	CalPERS Actuarial Valuation as of June 30, 2016 *(to be reviewed by the Budget & Finance Committee).*
Motion	9.	Authorize the General Manager to Execute Task Order No. 2 with CH2M HILL Engineers, Inc. for the Odor Control Alternatives Study *(to be reviewed by the Engineering and Information Technology Committee).*
Motion	10.	Consider a Resolution Designating Authorized Representatives for FEMA and State OES Disaster Assistance *(to be reviewed by the Legal/Community Affairs Committee).*
Information	11.	Bay Area Air Quality Management District Regulation 11, Rule 18 *(to be reviewed by the Legal/Community Affairs Committee).*
Information	12.	Check Register.

Information | 13. Committee Meeting Reports. *(No Board action is taken at Committee meetings):*

a. Legal/Community Affairs Committee – Wednesday, February 21, 2018, at 4:45 p.m.
   - Director Handley and Director Lathi

b. Engineering and Information Technology Committee – Thursday, February 22, 2018, at 9:15 a.m.
   - Director Fernandez and Director Kite

c. Budget & Finance Committee – Friday, February 23, 2018, at 9:00 a.m.
   - Director Handley and Director Toy

d. Audit Committee – will not meet.

e. Legislative Committee – will not meet.

f. Personnel Committee – will not meet.

Information | 14. General Manager's Report. *(Information on recent issues of interest to the Board).*

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15. Other Business:

a. Comments and questions. *Directors can share information relating to District business and are welcome to request information from staff.*

b. Scheduling matters for future consideration.

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16. Adjournment – The Board will adjourn to a Special Meeting Closed Session in the Alvarado Conference Room on Tuesday, February 27, 2018, at 6:00 p.m.

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17. Adjournment – The Board will then adjourn to a Special Meeting Mid-Year Budget Board Workshop in the Boardroom on Thursday, March 1, 2018, at 5:30 p.m.

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18. Adjournment – The Board will then adjourn to the next Regular Meeting in the Boardroom on Monday, March 12, 2018, at 7:00 p.m.

The Public may provide oral comments at regular and special Board meetings; however, whenever possible, written statements are preferred (to be received at the Union Sanitary District at least one working day prior to the meeting).

If the subject relates to an agenda item, the speaker should address the Board at the time the item is considered. If the subject is within the Board's jurisdiction but not on the agenda, the speaker will be heard at the time "Oral Communications" is calendared. Oral comments are limited to three minutes per individual, with a maximum of 30 minutes per subject. Speaker's cards will be available in the Boardroom and are to be completed prior to discussion of the agenda item.

The facilities at the District Offices are wheelchair accessible. Any attendee requiring special accommodations at the meeting should contact the General Manager's office at (510) 477-7503 at least 24 hours in advance of the meeting. THE PUBLIC IS INVITED TO ATTEND

Directors
Manny Fernandez
Tom Handley
Pat Kite
Anjali Lathi
Jennifer Toy

Officers
Paul R. Eldredge
General Manager/
District Engineer

Karen W. Murphy
Attorney

LEGAL/COMMUNITY AFFAIRS COMMITTEE MEETING

Committee Members: Director Handley and Director Lathi

AGENDA
Wednesday, February 21, 2018
4:45 p.m.

Alvarado Conference Room
5072 Benson Road
Union City, CA 94587

1. Call to Order

2. Roll Call

3. Public Comment

4. Items to be reviewed for the Regular Board meeting of February 26, 2018:
   - Balanced Scorecard:
     - Second Quarter Fiscal Year 2018 District-wide Balanced Scorecard Measures
     - Balanced Scorecard for the Treatment and Disposal Services Work Group
     - Balanced Scorecard for the Fabrication, Maintenance, and Construction Work Group
   - Consider a Resolution Designating Authorized Representatives for FEMA and State OES Disaster Assistance
   - Bay Area Air Quality Management District Regulation 11, Rule 18

5. Adjournment

Items reviewed at committee meetings will be included in the agenda packet for the upcoming Board meeting. No action will be taken at committee meetings.

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ENGINEERING & INFORMATION TECHNOLOGY COMMITTEE MEETING

Committee Members: Director Fernandez and Director Kite

AGENDA
Thursday, February 22, 2018
9:15 A.M.

Alvarado Conference Room
5072 Benson Road
Union City, CA 94587

THIS MEETING WILL BE TELECONFERENCED WITH DIRECTOR KITE FROM THE EXTERIOR OF 35040 NEWARK BOULEVARD, NEWARK, CALIFORNIA.

1. Call to Order

2. Roll Call

3. Public Comment

4. Items to be reviewed for the Regular Board meeting of February 26, 2018:
   - Authorize the General Manager to Execute Task Order No. 2 with CH2M HILL Engineers, Inc. for the Odor Control Alternatives Study

5. Adjournment

Items reviewed at committee meetings will be included in the agenda packet for the upcoming Board meeting. No action will be taken at committee meetings. The Public may provide oral comments at regular and special Board meetings; however, whenever possible, written statements are preferred (to be received at the Union Sanitary District at least one working day prior to the meeting).If the subject relates to an agenda item, the speaker should address the Board at the time the item is considered. If the subject is within the Board's jurisdiction but not on the agenda, the speaker will be heard at the time "Public Comment" is calendared. Oral comments are limited to three minutes per individual, with a maximum of 30 minutes per subject. Speaker's cards will be available and are to be completed prior to discussion of the agenda item.

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THE PUBLIC IS INVITED TO ATTEND

BUDGET & FINANCE COMMITTEE MEETING

Committee Members: Director Handley and Director Toy

AGENDA
Friday, February 23, 2018
9:00 a.m.

Alvarado Conference Room
5072 Benson Road
Union City, CA 94587

1. Call to Order

2. Roll Call

3. Public Comment

4. Items to be reviewed for the Regular Board meeting of February 26, 2018:
   - CalPERS Actuarial Valuation as of June 30, 2016
   - General Manager Expense Reimbursement

5. Adjournment

Items reviewed at committee meetings will be included in the agenda packet for the upcoming Board meeting. No action will be taken at committee meetings.

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THE PUBLIC IS INVITED TO ATTEND

MINUTES OF THE MEETING OF THE
BOARD OF DIRECTORS OF
UNION SANITARY DISTRICT
February 12, 2018

CALL TO ORDER

President Kite called the meeting to order at 7:00 p.m.

PLEDGE OF ALLEGIANCE

ROLL CALL

PRESENT: Pat Kite, President
Anjali Lathi, Vice President
Jennifer Toy, Director
Tom Handley, Director

ABSENT: Manny Fernandez, Secretary

STAFF: Paul Eldredge, General Manager
Karen Murphy, District Counsel
James Schofield, Collection Services Manager
Sami Ghossain, Technical Services Manager
Armando Lopez, Treatment and Disposal Services Manager
Laurie Brenner, Business Services Team Coach
Michelle Powell, Communications and Intergovernmental Relations Coordinator
Gene Boucher, Human Resources Manager
Rollie Arbolante, Customer Service Team Coach
Danielle Lemos, Administrative Specialist
Regina McEvoy, Executive Assistant to the General Manager/Board Clerk

VISITORS: Alice Johnson, League of Women Voters
Roelle Balan, Tri-City Voice Newspaper
Mallika Ramanathan, Brown and Caldwell Managing Engineer

APPROVAL OF THE MINUTES OF THE REGULAR MEETING OF JANUARY 22, 2018

It was moved by Vice President Lathi, seconded by Director Toy, to approve the Minutes of the Regular Meeting of January 22, 2018. Motion carried with the following vote:

AYES: Handley, Kite, Lathi, Toy
NOES: None
ABSENT: Fernandez
ABSTAIN: None

WRITTEN COMMUNICATIONS

There were no written communications.

ORAL COMMUNICATIONS

There were no oral communications.

CONSIDER APPROVING A CAPACITY CHARGE REFUND FOR PROPERTY LOCATED AT 1550 PACIFIC STREET, NEAR CENTRAL AVENUE IN THE CITY OF UNION CITY

This item was reviewed by the Budget & Finance Committee. Technical Services Manager Ghossain stated the property located at 1550 Pacific Street in Union City went vacant in 2009, and the old building was demolished in 2014. The property was then subdivided into four separate parcels, one for each building. Sewer construction for the four new buildings at the site was completed in October 2015. When the sewer construction plans were reviewed and approved, the buildings were listed as 'spec' buildings meaning they would be subject to custom tenant improvements following identification of the tenants. In accordance with District Capacity Charge Ordinance 35.22, the Commercial/Industrial/Office Use rate was used to calculate the Capacity Charge. Exhibit A to Ordinance 35.22 is a fee schedule that shows the fees for warehouse connection category facilities are charged a lower rate than Commercial/Industrial/Office Use facilities. All four buildings constructed at the site are being used for warehouse purposes, and the property owner, Terreno Park Union City LLC, has requested a refund. Staff recommends the Board approve a credit against the property of $305,954.88 to the current property owners, Terreno Park Union City LLC.

The Board inquired, and staff agreed, that it would be prudent to spread the credit among the four separate parcels now using the square footage of each building. Staff will report back to the Board when completed.

It was moved by Director Handley, seconded by Director Toy, to Approve a Refund of $305,954.88 to the Property Owners, Terreno Park Union City LLC. Motion carried with the following vote:

AYES:	Handley, Kite, Lathi, Toy
NOES:	None
ABSENT:	Fernandez
ABSTAIN:	None

AUTHORIZE THE GENERAL MANAGER TO EXECUTE TASK ORDER NO. 2 WITH BROWN AND CALDWELL FOR THE STANDBY POWER GENERATION SYSTEM UPGRADE PROJECT

This item was reviewed by the Engineering and Information Technology Committee. Technical Services Manager Ghossain stated the District's existing standby power system at the Plant consists of six diesel standby engine-generators. Beecher Engineering completed a study in April 2016 to evaluate the condition of the current standby generation system and recommend upgrades to the existing generator control systems. The study concluded the equipment had reached the end of its useful life, and recommended replacement of the six existing generators with three larger units. Brown and Caldwell provided predesign services for the Project, which included evaluation of 11 alternatives. District staff and Brown and Caldwell selected the alternative which includes three new 12-kV standby generators and a dual-feed switchgear at Substation 2. Technical Services Manager Ghossain stated there will be space reserved for an additional generator, electrical switch gear, and battery system if needed. Task Order No. 2 will be for final design services for the Project. General Manager Eldredge stated that the District has been working with an integrator to keep the current system functioning. The integrator recently accepted a position with another public agency, and a Mutual Aide Agreement will be considered that would allow the District to maintain a relationship with the integrator until the new system is functional. Staff recommended the Board authorize the General Manager to Execute Task Order No. 2 with Brown and Caldwell in the amount of $1,975,808 for the Standby Power Generation System Upgrade Project.

It was moved by Vice President Lathi, seconded by Director Toy, to Authorize the General Manager to Execute Task Order No. 2 with Brown and Caldwell in the Amount of $1,975,808 for Final Design Services for the Standby Power Generation System Upgrade Project. Motion carried with the following vote:

AYES: Handley, Kite, Lathi, Toy
NOES: None
ABSENT: Fernandez
ABSTAIN: None

REVIEW CENTENNIAL OPEN HOUSE PROPOSED INVITATION AND PROVIDE DIRECTION

Communications and Intergovernmental Relations Coordinator Powell stated staff have prepared a formal invitation to the District’s Centennial Open House to be signed by the Board President and sent to elected and appointed officials. Executive Assistant to the General Manager/Board Clerk McEvoy stated staff will invite additional community organizations, stakeholders, consultants, vendors, and other individuals via email.

INFORMATION ITEMS:

Board Expenses for the 2nd Quarter of Fiscal Year 2018
This item was reviewed by the Budget & Finance Committee. Business Services Coach Brenner presented the Board of Directors Quarterly Travel and Training Expenditure Report for the 2nd quarter of Fiscal Year 2018.

Report on the East Bay Dischargers Authority (EBDA) Meeting of January 18, 2018
Director Toy provided an overview of the EBDA meeting minutes included in the Board meeting packet.

Check Register
All questions were answered to the Board's satisfaction.

COMMITTEE MEETING REPORTS:

The Engineering and Information Technology and Budget & Finance Committees met.

GENERAL MANAGER'S REPORT:
General Manager Eldredge reported the following:

- The EBDA Commission will consider a contract for the new EBDA General Manager at the regular meeting to be held February 15, 2018. General Manager Eldredge will invite the new EBDA General Manager to be introduced at a future Board meeting.
- City of Union City will be considering a resolution to declare a Fiscal Emergency at its City Council meeting of February 13, 2018.
- General Manager stated the demolition of the old Newark Treatment Plant had begun.

OTHER BUSINESS:
There was no other business.

ADJOURNMENT:

The meeting was adjourned at 7:47 p.m. to the next Board Meeting in the Boardroom on Monday, February 26, 2018, at 7:00 p.m.

SUBMITTED:

REGINA McEVOY
BOARD CLERK

ATTEST:

MANNY FERNANDEZ
SECRETARY

APPROVED:

PAT KITE
PRESIDENT

Adopted this 26th day of February 2018

DATE: February 26, 2018

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Laurie Brenner, Business Services Coach

SUBJECT: Agenda Item No. 5a Meeting of February 26, 2018
Information Item: **Second Quarter FY 18 District-Wide Balanced Scorecard Measures**

Recommendation:
Information Only.

Background:
This report summarizes progress meeting the District's strategic objectives for the second quarter of fiscal year 2017-18 (October 1 through December 31, 2017).

Safety
The District met published targets for all Safety measures in the second quarter of FY 18. Efforts to schedule "Best Practice" safety site visits will resume in January 2018.

See Table 1: Safety Objectives and Measures, for District performance against all safety measures in Q2.

Operational Excellence

The District also met all published targets for the Operational Excellence measures in Q2 of FY18.

There has been a change to the criteria for the standard SSC (sewer service charge) comparison survey measure. To be included, agencies must:

- Be within a 30-mile radius of USD
- Have at least 100 miles of Collection System and/or 5 MGD (million gallons per day) of wastewater being treated

Because of this change, the name of the measure has been changed from “Residential SSC compared to surrounding areas,” to “Residential SSC compared to other agencies.” Additionally, the values for both Q1 and Q2 of FY18 have been changed to 5.8% to reflect the District’s rank percentile from the updated survey completed in September 2017.

There were 21 recorded assessments completed for the “# Competency assessments…” measure in CS in Q2, totaling 25 YTD, against the planned total of 65 for the year. The trend in recent years has been limited progress against the goal during the first half of the year, with concerted efforts in completing assessments in the latter part of the fiscal year. This is not believed to be a material concern.

See Table 2: Operational Excellence Objectives and Measures, for District performance against all operational measures in Q2.

Legend for Table 1 and Table 2:

Green: meeting or exceeding target or projected to meet target by the end of the fiscal year
Yellow: Will not meet target if trend continues, and/or not meeting target by <10%- needs attention
Red: Will not meet FY target by >10%- corrective action needed

Table 1: **Safety Objectives and Measures**

Measures	Q2 FY18	FY18 Target	YTD	FY17	FY16	FY15	Comments
Total accidents with lost days	0	**0**	0	1	2	3	
Other OSHA reportable accidents	0	**<4**	0	2	0	0	
# Incidents of vehicle or equipment accidents/damage	0	**<2**	0	1	3	3	
Cost associated with vehicle/equipment accidents	$0	**<$5000**	$0	$0	$540	$444	
Ave FTE lost time	0	**<0.5**	0	0.15	0.145	0.4875	
"Total Costs: Lost time wages only	$0	**≤$46,883**	$0	$16,450	$9,883	$48,903.84	
Ave FTE limited duty time	0	**≤0.5**	0	0.15	0.12	0.53	
"Total costs: Limited duty/Other ½ wages	$0	**≤$23,441**	$0	$9,517	$4,775	$26,545.28	
X-Mod	0.78	**≤1.0**	0.78	0.72	1.01	1.16	
# Facility inspections completed (SIT)	1	**4**	2	4	4	4	Q2- Treatment Plant
% of areas of concern identified during SIT resolved within 45 days	93.75%	**≥90%**	92.88%	97%	90%	95%	Q2= 15/16 resolved
# work site inspections completed	87	**≥282**	195	297	337	300	Q1 updated to 108
# site visits (for potential BMPS)	0	**≥2**	0	0	1	2	Scheduling attempts should resume after January, 2018
# GM communications on safety	1	**≥4**	3	8	8	9	Blog response regarding cleanliness and sanitation of handrails in the staircases in buildings
# of major safety training events offered	4	**7**	6	15	1	8	Q2- Fall Protection, Hazmat, Trenching, Utility Safety
Ave. % of targeted employees trained	93.39%	**≥90%**	92.1%	95.1%	77.8%	80%	184/196 in the Q2 trainings

Table 2: **Operational Excellence Objectives and Measures**

Measures	Q2 FY18	FY18 Target	YTD	FY17	FY16	FY15	Comments
Outreach plan milestones: % completed	19.67%	≥90%	45.90%	98.4%	92.8%	94%	Some activities planned as cycling; all quarters not evenly loaded
Response time to calls for service: % under 1 hour	97.50%	≥95%	97.50%	97.3%	97.5%	97.7%	
Response time to contact USD inquiries	91.3%	≥90%	95.65%	96.5%	96.9%	96.4%	Q2= 21/23 inquiries
# Total adverse impacts on customers	2	≤10	4	4	10	5	2 minor vehicle accident claims filed in Q2
# Emergency preparedness events	1	3	2	3	2	5	Great Shakeout Drill in Q2
Residential SSC compared to other agencies	5.8th	Below the 33rd percentile	5.8th	11.50th	11.50th	15.3rd	In September 2017, new SSC survey criteria were established, including additional agencies within a 30-mile radius, and having over 100 miles of sewer pipe and/or treated flows of more than 5 million gallons per day (MGD)
Projects/initiatives with financial benefit	3	≥3	3	3	3	3	
# Critical asset failures w/o negative impacts	0	≤2	0	0	0	0	
# critical asset failures with negative impacts	0	0	0	0	3	2	
Priority CIP Project milestones met vs. planned	80%	≥85%	90%	93.3%	63%	92%	8/10 on target in Q2; Digester 7 and Emergency Power Generation projects are slightly behind
# adverse impacts on environment	0	0	0	1	1	2	
Projects/initiatives with environmental benefit	3	≥3	3	3	3	3	
Category 2/3 SSOs	1	≤10	1	3	5	4	On 10/4/17, an ARV issues resulted in a Cat 3 spill of 501 gallons. 100% of the material was recovered.

% Training System Milestones Completed (cumulative total)	17.6%	100%	58.8%	100%	76%	100%	Q1 updated from 29.4% to 41.2% based on newly received information.
# competency assessments completed	21	65	25	74	58	60	Same anticipated slow start as prior year; not believed to be a concern against the annual goal.

DATE: February 9, 2018

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Armando Lopez, Operations Manager, T&D Work Group
Ric Pipkin, TPO Coach, T&D Work Group

SUBJECT: Agenda Item No. 5b - Meeting of February 26, 2018
Information Item: **Plant Process Scorecard**

Background

This report covers the first two quarters of Fiscal Year 2018 and recaps Fiscal Year 2017. The T&D staff operates the District's wastewater treatment plant, manages all environmental laboratory services for the District, and produces the regulatory monitoring reports required for permit compliance. The performance measures for the Plant Process Scorecard focus on the following areas: process control and compliance; energy and chemical efficiency; and employee skill development.

A recap of FY17 shows that T&D missed its target in three areas. The instances recorded for Number of Adverse Impacts were a result of numerous odor complaints registered by one resident. Water usage was higher than normal and after investigation did not find a concrete reason for this usage. Current water usage is on target. This information and the results of our investigation leads us to believe that our temporary increase of water usage may stem from construction efforts at the plant. The Thickener Project had many negative impacts on process health. One of the key areas of impact was our inability to thicken our sludge to our normal target and therefore had to use more polymer in the dewatering process to meet our dewatering target.

All other measures met or surpassed expectations.

Process Control and Compliance:
The "Plant Health Index" (PHI) measure tracks twelve aspects of treatment plant process performance. The index includes the activated sludge and anaerobic digestion processes, electrical power generation, chemical and energy utilization, and NPDES Permit compliance. The index value average met the target of 85% or greater for FY17. The PHI for FY18 is on track to meet the target.

Although T&D met all NPDES compliance measures for FY17 and is on track to continue regulatory excellence during FY18, achieving compliance is becoming increasingly more difficult to attain. A combination of increasing load and historically poor settling Activated Sludge are posing serious challenges. The Solids Capacity Phase II study (Draft), has helped us confirm the root cause of our challenges and proposed solutions. We are working with District Engineering Staff to determine the most reasonable solutions and ensuring we incorporate the solutions into the Plant Master Plan effort.

The Biosolids measure tracks the percentage and amount of wet tons disposed of as Class A (composting facility). In FY17, the percentage met the target of 25%, and is on track to meet the target for FY18.

Laboratory service measures track timely analysis of samples for the EC Team and annual compliance with State proficiency standards for accredited environmental laboratories. All laboratory measures met or exceeded their targets for FY17. The percentage is slightly below the target of 95% or greater in FY18. This is due to the hiring of a new Laboratory Director and revamping the way the measure is calculated.

Planned Maintenance:
Completing preventive maintenance on time ensures that equipment is kept operating at peak efficiency, and that problems are promptly identified and corrected. TPO met the target of 95% or greater for completing preventive maintenance work orders within the month they are scheduled for FY17. Despite continued turnover and on-going Operator training, TPO continues to meet the target during FY18.

Energy, Chemical, and Water Utilization:
Electricity production from the District's cogeneration system in FY 18 is averaging 26,288 kwh/d (kilowatt-hours per day) which is exceeding the target.

Due to changes with AT&T, solar information has been unavailable beginning November 1, 2016. FMC and IT staff have worked on gathering the data, and are working on pulling that data into the SCADA system.

Overall consumption of electricity at the plant is averaging 2,131 kwh/MG (kilowatt hours per million gallons treated) for the first half of FY18, which is slightly up from FY17 usage of 1,944 kwh/MG. The target value is 2,100 kwh/MG or less. The daily plant flow has averaged 22.8

million gallons per day (mgd) so far in FY18, which is less than the flow for FY17 24.4 mgd. A typical secondary wastewater treatment plant in the U.S. consumes 1,800 to 2,500 kwh/MG.

Polymer consumption for GBT is at the target of ≤5.5 average pounds/dry ton. Polymer consumption for dewatering is above the target of ≤33 average pounds/dry ton-

Water usage for the first half of FY18 is averaging 26,685 gallons per day, which is below the target of ≤30,000 gallons per day.

Hydrogen peroxide usage is above the target of ≤8.5 at 11.1 average gallons/hour and is primarily due to continuing difficulty with treating the incoming sewage in the force mains for hydrogen sulfide control. We are hoping to evaluate and confirm the best method for controlling sulfide generation with the upcoming study that CH2/Jacobs Engineering will be conducting in calendar year 2018.

There were 6 odor complaints registered mainly by one resident in the first half of FY18. Two complaints were attributable to the plant during the first half of FY18. In one event, a faint odor that resembled the secondary clarifiers was detected near the customer's home. The other event involved a very heavy smell from our debris box at headworks. It had an unusually full and odorous content that was immediately addressed with odor masking granules. We have changed our operational practice and now proactively add odor masking granules on a schedule. All existing plant odor control systems were working properly during both events.

Plant Process Scorecard

	Measures		2018 Fiscal Year to Date	Target	2017 Fiscal Year End
Customer	Number of adverse impacts: Odor Complaint Calls		6	0	17
	Number of adverse impacts: Odor Complaints Attributable to the Plant		2	0	0
	Number of adverse impacts: Violations, Spills, etc.		0	0	0
Financial	Water Usage – Alvarado Site (Gallons Used per Day)		26685	≤ 30,000	30030
	Total Kwh/MG Alvarado Site (Avg per Month)		2131	< 2100	1944
	PG&E Purchased – kwh/day		13367	Track	20543
	On-site Power Generation (Avg kwh/day)		35301	23,088	26288
	Solar Production – kwh/day		No Data	Track	445
	Total Electrical Usage – kwh/day		48667	Track	47128
	H2S/Odor Control	Ferrous Chloride (Ave gal/hour)	32	≤ 35	32
		Hydrogen Peroxide (Ave gal/hour)	11.1	≤ 8.5	8.4
	Disinfection	Hypochlorite (Ave gal/hour)	31.3	≤ 43	38.5
	Solids Conditioning	GBT Polymer (Lbs/dry ton-avg)	4.2	≤ 5.5	4.8
		Dewatering Polymer (Lbs/dry ton-avg)	33.2	≤ 33	34.9
Internal Processes	Biosolids Disposal – Percent Disposed of as Class A		40%	25%	32%
	Plant Operational Health Index (Ave monthly value)		95%	≥ 85%	89%
	Percent preventative maintenance work orders completed within month scheduled		96%	≥ 95%	99%
	Percent Environmental Compliance Samples that Met Turnaround Time (12 days)		94%	≥ 95%	100%
	State Proficiency Test, Percent Areas Passed (T&D Lab)		100%	> 85%	100%
Learning & Growth	Number of Training Modules Updated		4	2	4

DATE: February 26, 2018

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Robert Simonich, Maintenance Manager, FMC Workgroup

SUBJECT: Agenda Item No. 5.c - Meeting of February 26, 2018
Information Item: **Plant and Pump Station Maintenance Process Scorecard**

Background

In previous years, Fabrication, Maintenance and Construction (FMC) and Treatment & Disposal Services (T&D) shared a combined Plant Process Scorecard containing performance measurement data for both workgroups. Beginning in fiscal year 2014, FMC and T&D began keeping separate Scorecards and tracking performance measurement data separately.

This report covers the first two quarters of Fiscal Year 2018 and recaps Fiscal Year 2017. The FMC staff maintains the District's wastewater treatment plant, pump stations, and influent force main system. The performance measures for the FMC Process Scorecard focus on the following areas: planned maintenance, labor utilization, energy efficiency at the pump stations, and employee skill development.

Planned Maintenance and Labor Utilization:

The percentage of time FMC spends on planned maintenance work vs. unplanned maintenance work is one of our benchmarking measures. The Water Environment Federation (WEF) identifies planned maintenance at a level greater than 90% as a "best practice." Using WEF's definition for planned work that is preventive, predictive, an asset failure, scheduled vs. unplanned, or corrective, the FMC work group is averaging 99% of completed planned maintenance activities. The plant has experienced one critical asset failure within the past four fiscal years.

A second benchmarking measure tracks the percentage of preventive maintenance work orders completed within the month scheduled. Completing preventive maintenance on time ensures that equipment is kept operating at peak efficiency, and that problems are promptly identified and corrected. The FMC work group is at 95%, which is our target.

The FMC work group also tracks the number of Priority A work orders issued. This measure is meeting the target of 10 or less per month at an average of 2 per month. Meeting the target for Priority A work orders is a key indicator of the quality of our preventive and predictive maintenance program.

Increasing the efficiency of our labor force is also a goal of the FMC work group. The performance measure used is the percentage of total man-hours spent on the performance of maintenance work. The FMC Workgroup fell slightly below the target of 80% to 78%. This measure is expected to exceed in the 3rd quarter.

Overtime remains below the target of 5%. Overtime has increased from 3.1% in FY17 to 3.4% in FY18 due to the addition of new employees within the FMC work group and the increased support we have provided for numerous CIP projects.

Energy Efficiency:
FMC continues to track energy consumption at the Irvington and Newark Pump Stations. It is anticipated that targets will be developed for FY19.

Employee Skill Development:
The Learning and Growth measure on the scorecard tracks development of the District's competency-based training program. FMC has implemented a new measure that reports the number of outside trainings that employees attend. Over the past year we have sent 19 employees to the five training events.

Staff will be present to answer questions.

Plant and Pump Station Maintenance Process Scorecard

	Measures	2018 Fiscal Year Year-to-Date	Target	2017 Fiscal Year
Customer	Number of priority A work orders (Average per Month)	2	< 10	3
	Number of critical asset failures	0	0	0
	Number with negative impact on the environment	0	0	0
Financial	% Total hours worked spent on maintenance work	78.1%	≥ 80%	81.4%
	Overtime as % of Base Payroll (Ave per month)	3.4%	≤ 5%	3.1%
Internal Processes	% of Time spent on planned vs. unplanned maintenance activities (Best in Class 90%)	99.2%	75% - 90%	98.9%
	Percent preventative maintenance work orders completed within month scheduled	95.0%	≥ 95%	94.0%
	Number of Corrective Work Orders Over 90 Days (Ave/Qtr.)	41	≤150	71
Employees	Number of outside employee trainings	5	Track and Report	4

DATE: February 26, 2018

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Laurie Brenner, Business Services Coach

SUBJECT: Agenda Item No. 8 - Meeting of February 26, 2018
Information Item: **CalPERS Actuarial Valuation as of June 20, 2016, Required Contributions for Fiscal Year 2019 with Estimates Through 2024**

Recommendation

Information only.

Background

The District receives an actuarial report on the Districts pension plan annually from the California Public Employees' Retirement System (CalPERS). Effective with the 2016 valuation report, CalPERS continues to provide a percentage contribution on current wages, also called Employer Normal Cost Rate, but is now also providing a flat dollar amount for the Districts unfunded pension liability (UAL).

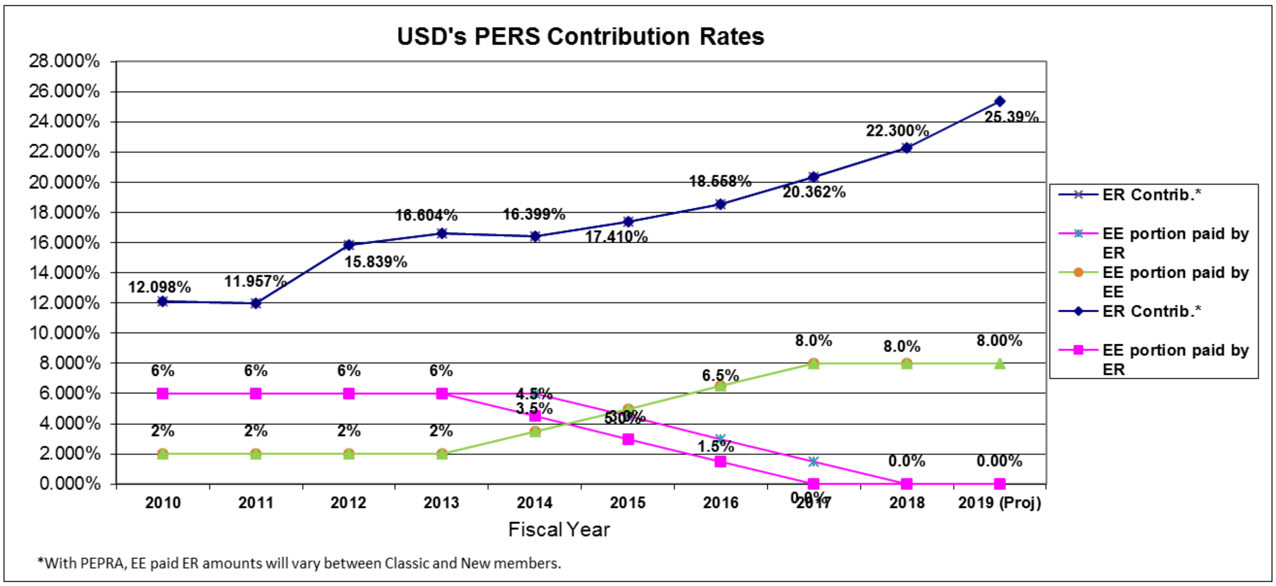
Both the Normal Cost and the UAL have been calculated as a total percentage of payroll by CalPERS (see the top of page 3 of this staff report). If you recall, last year's report did not include this calculation, but member agencies requested that it be included for clarity. The UAL contribution is calculated with a 30-year amortization schedule. CalPERS has separated the contributions made on current payroll (Normal Cost Rate) and the fixed UAL contributions due to lower rates of return on investments and to establish a stable method for paying down a members' UAL.

The Districts CalPERS Employer rate for FY18 was 22.299%, which included the Normal Cost Rate of 8.793% and 13.506% rate attributed to the UAL. The 2019 projections only show a percentage for the Normal Costs, the UAL is shown as a lump sum. The following table summarizes the most recent actuarial report from CalPERS, which is attached.

Summary of CalPERS Report:

		FY18	FY19	
Employer Contribution Rate		8.793%	9.368%	
Employee Contribution Rate		8.00%	8.00%	
Total Normal Cost =		*16.793%*	*17.368%*	
Annual UAL Payment		$2,139,379	$2,648,073	
Employer Contribution		$1,392,814	1,551,307	
Estimated Total Employer Contribution		$3,532,193	4,199,380	
Employee PEPRA Rate		6.25%	6.25%	
Projected Annual Payroll for Contribution Year		$15,840,043	$16,559,643	

* - includes the UAL for FY 17



The chart above displays the District's CalPERS contribution rate from fiscal years 2010 through 2019. The estimated percentage displayed for FY 2019 is to illustrate a comparison of CalPERS rates with prior fiscal years. The FY 2019 estimated percentage combines the Normal Cost Rate with the lump sum UAL payment required for FY 2019 and converts the total to percentage of the estimated payroll of $16,559,643.

Based on CalPERS assumptions the total increased contribution percentage rate between FY 2018 and 2019 is 3.059%. The lump sum UAL payment is fixed, therefore if the estimated payroll for FY 2019 is less than CalPERS assumptions, the percentage of 25.359% would increase because the total CalPERS payments (Normal Cost and fixed UAL payment) would be a greater percentage of the total payroll. Conversely, the overall District payment would be less however, as the total required contribution for the Normal Cost Rate would be calculated off a lower payroll assumption.

The five-year projected CalPERS Normal Cost contribution rates and UAL contributions based on the June 30, 2016 actuarial report are below. It is important to note that these projected future contributions to the UAL only take a portion of the most recent revisions to the assumed rate of return (discount rate) into account as these changes will be phased in over a three-year period.

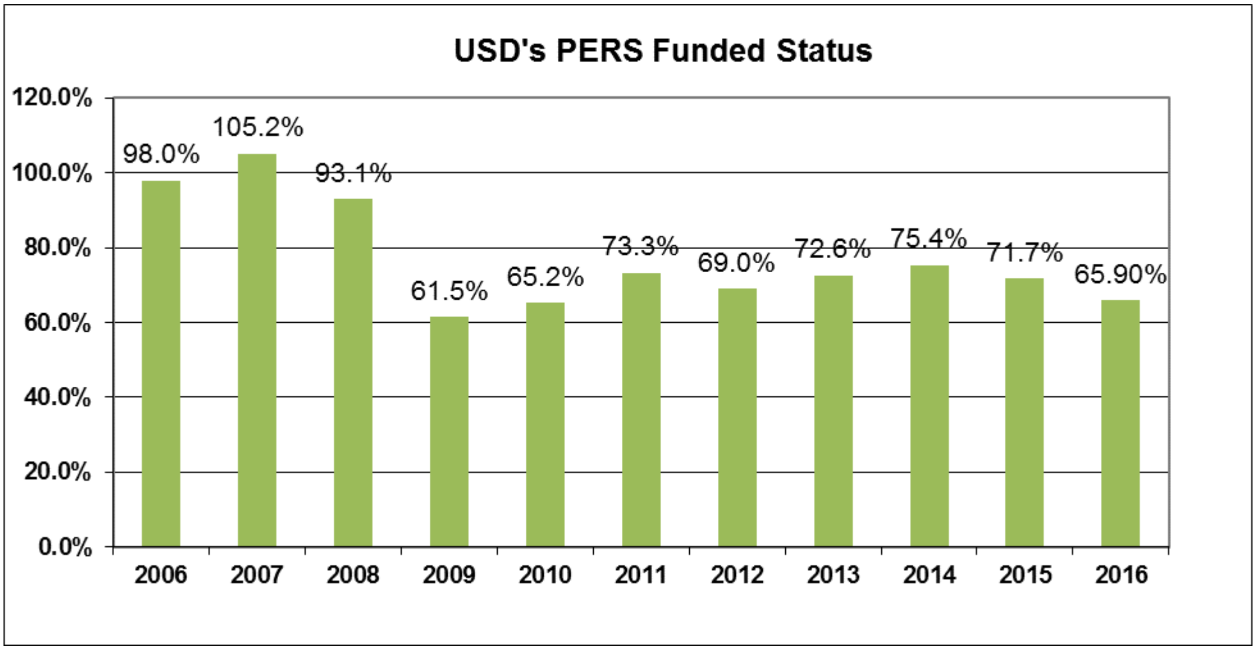
	Contribution	Projected Future Employer Contributions				
	2018-19	2019-20	2020-21	2021-22	2022-23	2023-2024
Employers Normal Cost	9.368%	9.8%	10.8%	10.8%	10.8%	10.8%
UAL Payment	$2,648,073	$3,220,00	$3,654,000	$4,161,100	$4,604,000	4,895,000
Estimated Employer Contribution Rate*	25.4%	28.7%	31.6%	33.8%	35.5%	36.3%

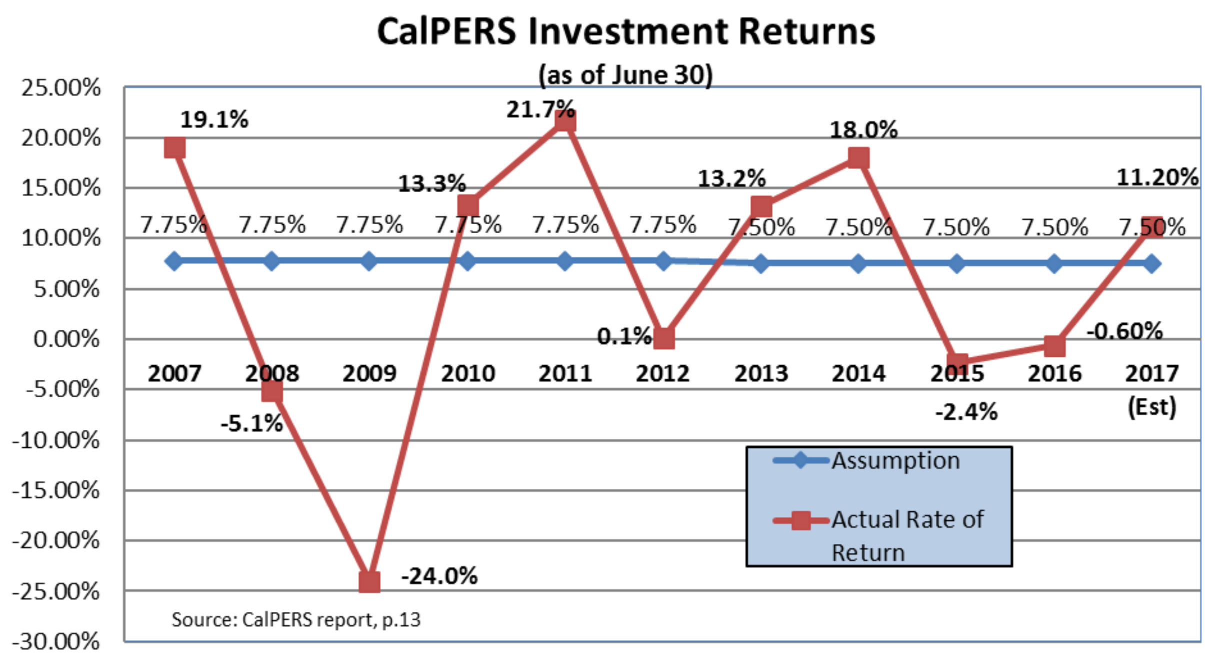
* Estimated Employer Contribution Rate is calculated by combining the Normal Cost Rate with the lump sum UAL payment and converts the total to a percentage of estimated payroll.

Unfunded Pension Liability

The Districts pension plan's unfunded liability as of June 30, 2016, was $45,046,856; which is net of the accrued liability of $131,997,730 less the market value of assets totaling $86,950,874. The previous year the unfunded liability was just $34,955,575, highlighting an increase of $10,091,281 this year, primarily due to the change in the assumed rate of return or discount rate and, the number of members receiving payments (retirees) versus active members (those still working). This is a difficulty that will continue for CalPERS as it is a maturing pension system in which retirees will soon outnumber active workers in the plan.

The Districts plan is currently 65.9% funded, a decrease of 5.8% from the funding ratio as of June 30, 2015. The primary reason for this decrease in funding status is the increase in the UAL. As of December of 2017, the overall funding status for the entire CalPERS program is approximately 68%. The following charts reflect the historical funding ratio of the District's plan from 2006 through 2016 and the CalPERS investment returns. Both charts display how the earnings on the pension plan's assets impact the funding status of the District's pension plan, and the implementation of new actuarial assumptions that reflect the greater life expectancies of its members.



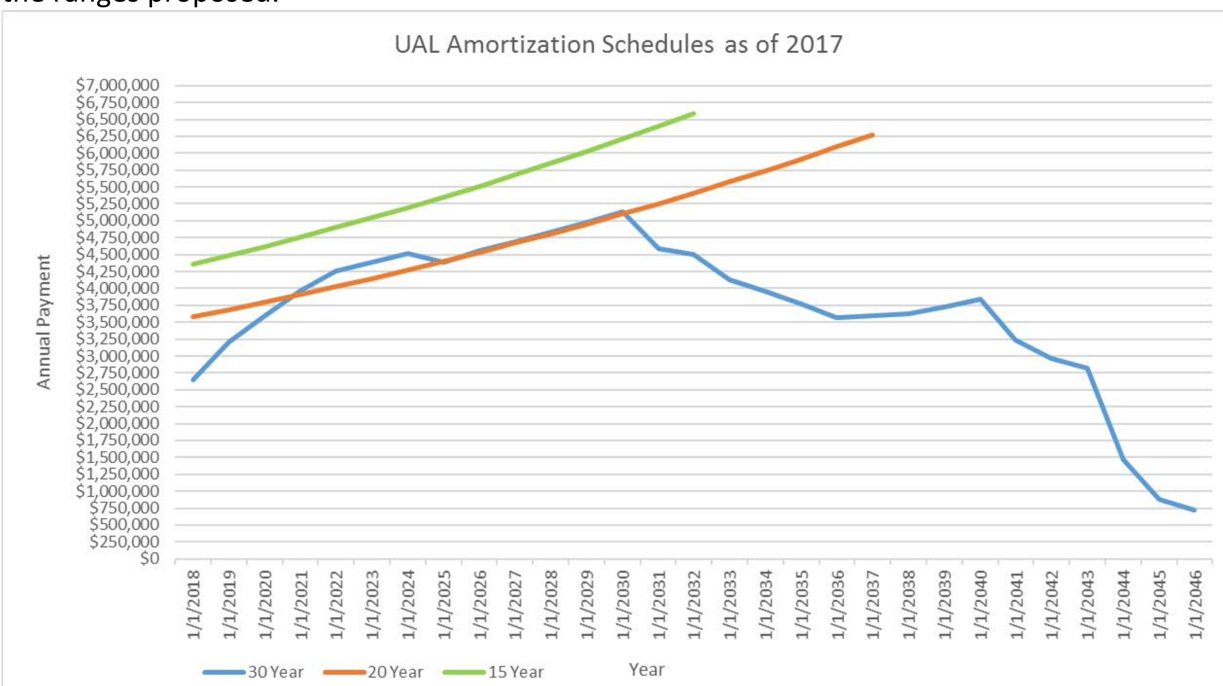


Shown below are projected future year amortization schedules for annual payments to pay down the UAL over a 30-year, 20-year, and 15-year period. The schedules do not attempt to reflect any modifications to earnings or actuarial assumptions after June 30, 2016, and thus deviate somewhat from the actuarial assumed UAL payments shown in the table above and does not consider the most recent adjustments to the discount rate. The intent of this chart is to illustrate PERS assumed payoff schedule for the UAL based upon different payoff schedules and the fiscal impact. The estimated savings between the 30-year and 20-year schedule is approximately $10,667,406, and $25,838,734 between the 30-year and 15-year schedule.

Future Contributions to CalPERS

The CalPERS Board of Directors voted to lower the discount rate from 7.5% to 7.0% over a three-year period last year. This decision was made due to lower expected investment returns and to ensure the long-term sustainability of the CalPERS fund. Attached to this staff report is the Circular Letter the District received January 19, 2017, that discusses the phase in of the 7.0% discount rate. The Discount Rate for FY 2018-19 will be 7.375%; 7.25% for FY 2019-20; and 7.0% for FY 2020-21. The lowering of the discount rate means the District will see increases in both the normal cost and the UAL.

The rate impact of the lowering of the discount rate was applied to the June 30, 2016, valuation and the lowering of the discount rate will start FY 2018-19. District contribution rates as a result of the discount rate changes are estimated below. The normal cost portion of the employer contribution is expected to increase by the estimated payroll percentage. The increases to the UAL will be relative increases to the projected UAL payments. According to CalPERS, the District can more than likely expect to see increases somewhere in the middle of the ranges proposed.



Valuation Date	Fiscal Year Impact	Normal Cost	UAL Payments
6/30/2016	2018-19	0.25% - 0.75%	2% - 3%
6/30/2017	2019-20	0.5% - 1.5%	4% - 6%
6/30/2018	2020-21	1.0% - 3.0%	10% - 15%
6/30/2019	2021-22	1.0% - 3.0%	15% - 20%
6/30/2020	2022-23	1.0% - 3.0%	20% - 25%
6/30/2021	2023-24	1.0% - 3.0%	25% - 30%
6/30/2022	2024-25	1.0% - 3.0%	30% - 40%

There is also current discussion taking place at CalPERS about continuing to lower the discount rate over the next few years to at least 6.5%, with a strong possibility of the discount rate going as low as 6.0% at some point in the relatively near-term future. CalPERS has provided tools for members to use to project the impact of these increases.

Staff will provide the Board the projected pension plan contribution dollar amounts at the upcoming mid-year budget review workshop on March 1, 2018. District staff have been, and will continue to explore options to manage the unfunded liabilities with the goal of having minimal impact on District rate payers. This will take some time to accomplish and will require actuarial assistance from CalPERS.

Attachments:
CalPERS Circular Letter – Discount Rate 7%
CalPERS Fact sheet – Pension Funding
CalPERS Fact sheet – Pension Retirement
League of CA Cities Web Article- Factors Affecting CalPERS Funding
CalPERS June 30, 2016 Actuarial Report

CalPERS

Actuarial
Circular Letter

California Public Employees' Retirement System
P.O. Box 942715
Sacramento, CA 94229-2715
(888) CalPERS (or **888-225-7377**)
TTY: (877) 249-7442
www.calpers.ca.gov

January 19, 2017

Circular Letter: 200-004-17
Distribution: VI

To: **All Public Agency Employers**

Subject: **Discount Rate Change**

The purpose of this Circular Letter is to inform you of recent changes to the CalPERS discount rate assumption and the impact these changes are expected to have on required employer and PEPRA member contributions. This Circular Letter will assist you in calculating projected pension cost increases in future years. The June 30, 2016, annual valuations will provide updated projections of expected future year pension contributions. These reports will be available this summer.

At the December 21, 2016, meeting, the CalPERS Board of Administration approved lowering the CalPERS discount rate assumption, the long-term rate of return, from 7.50 percent to 7.00 percent over the next three years. This will increase public agency employer contribution costs beginning in Fiscal Year 2018-19.

The phase-in of the discount rate change approved by the Board for the next three Fiscal Years is as follows:

Valuation Date	Fiscal Year for Required Contribution	Discount Rate
June 30, 2016	2018-19	7.375%
June 30, 2017	2019-20	7.25%
June 30, 2018	2020-21	7.00%

Lowering the discount rate means plans will see increases in both the normal costs (the cost of pension benefits accruing in one year for active members) and the accrued liabilities. These increases will result in higher required employer contributions.

In addition, active members hired after January 1, 2013, under the Public Employees' Pension Reform Act (PEPRA) may also see their contribution rates rise.

The benefits of reducing the discount rate include:

- Strengthening long-term sustainability of the fund
- Reducing negative cash flows; additional contributions will help to offset the cost to pay pensions
- Reducing the long-term probability of funded ratios falling below undesirable levels
- Improving the likelihood of CalPERS investments earning our assumed rate of return
- Reducing the risk of contribution increases in the future from volatile investment markets

Results

Employer contribution increases as a result of the discount rate changes are estimated below by Normal Cost and required Unfunded Accrued Liability (UAL) payment. The Total Employer Contribution is the sum of the Normal Cost Rate applied to reported payroll plus the Unfunded Accrued Liability payment. The Normal Cost portion of the Employer Contribution is expected to increase by the listed percentages of payroll. Increases to the UAL payments are provided as relative increases to be applied to the projected UAL payments in the June 30, 2015, valuation report.

		Normal Cost		UAL Payments	
Valuation Date	Fiscal Year Impact	Misc. Plans	Safety Plans	Misc. Plans	Safety Plans
6/30/2016	2018-19	0.25% - 0.75%	0.5% - 1.25%	2% - 3%	2% - 3%
6/30/2017	2019-20	0.5% - 1.5%	1.0% - 2.5%	4% - 6%	4% - 6%
6/30/2018	2020-21	1.0% - 3.0%	2.0% - 5.0%	10% - 15%	10% - 15%
6/30/2019	2021-22	1.0% - 3.0%	2.0% - 5.0%	15% - 20%	15% - 20%
6/30/2020	2022-23	1.0% - 3.0%	2.0% - 5.0%	20% - 25%	20% - 25%
6/30/2021	2023-24	1.0% - 3.0%	2.0% - 5.0%	25% - 30%	25% - 30%
6/30/2022	2024-25	1.0% - 3.0%	2.0% - 5.0%	30% - 40%	30% - 40%

The changes to the Unfunded Accrued Liability (UAL) due to changes of actuarial assumptions are amortized over a fixed 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. The 5-year ramp up means that the payments in the first four years of the amortization schedule are 20 percent, 40 percent, 60 percent and 80 percent of the ultimate payment, which begins in year five. The 5-year ramp down means that the reverse is true and the payments in the final four years are ramped down by the above percentages. A new ramp is established with each change to the discount rate. There will be three ramps established in the first three years. As a result of the 5-year ramp up and effective date of the increase, it will be seven years until the full impact of the discount rate change is completely phased in. The shaded rows above are the expected increases beyond the five year projection quoted in your June 30, 2015, valuation report.

To illustrate how this table can be used as a guide to include the change in the discount rate in the calculation of pension contributions, a Miscellaneous plan with a current normal cost of 15 percent of payroll can expect an increase to 15.25 percent to 15.75 percent of payroll in the first year (Fiscal Year 2018-19), and 16 percent to 18 percent in the fifth year (Fiscal Year 2022-23). For the UAL payment, a plan with a projected payment of $500,000 in Fiscal Year 2018-19 and $600,000 in Fiscal Year 2022-23 can expect the revised payment to be $510,000 - $515,000 ($500,000x2.00%/$500,000x3.00%) for Fiscal Year 2018-19, and $720,000 - $750,000 ($600,000x20%/$600,000x25%) for Fiscal Year 2022-23. These estimated increases incorporate both the impact of the discount rate change and the ramp up.

Please keep in mind the above table is a tool for you to calculate broad estimates and should only be used as a general guide. The annual valuation report that will be released this summer will provide updated projections for your specific plan.

If you have any questions about the information provided or how to apply it to your current valuations, please call our CalPERS Customer Contact Center at **888 CalPERS** (or **888**-225-7377) and ask to have your plan actuary contact you.

Scott Terando
Chief Actuary

Investments (PERF*)

Total Fund Market Value & Total Net Investment Return** 10-year Review

(for FY end 6/30)

	(in billions)	(%)
2017	$326.4	11.2%
2016	$302.0	0.6%
2015	$301.9	2.4%
2014	$300.3	18.4%
2013	$257.9	13.2%
2012	$233.4	0.1%
2011	$237.5	21.7%
2010	$200.0	13.3%
2009	$180.9	(24.0%)
2008	$239.2	(5.1%)

* *Public Employees' Retirement Fund (PERF)*
** *Net time-weighted rate of returns*

Total Net Investment Return* *(for FY end 6/30)*

FY to date	11.2%
3 years	4.6%
5 years	8.8%
10 years	4.4%
20 years	6.6%
Total since Fund inception (1988)	**8.4%**

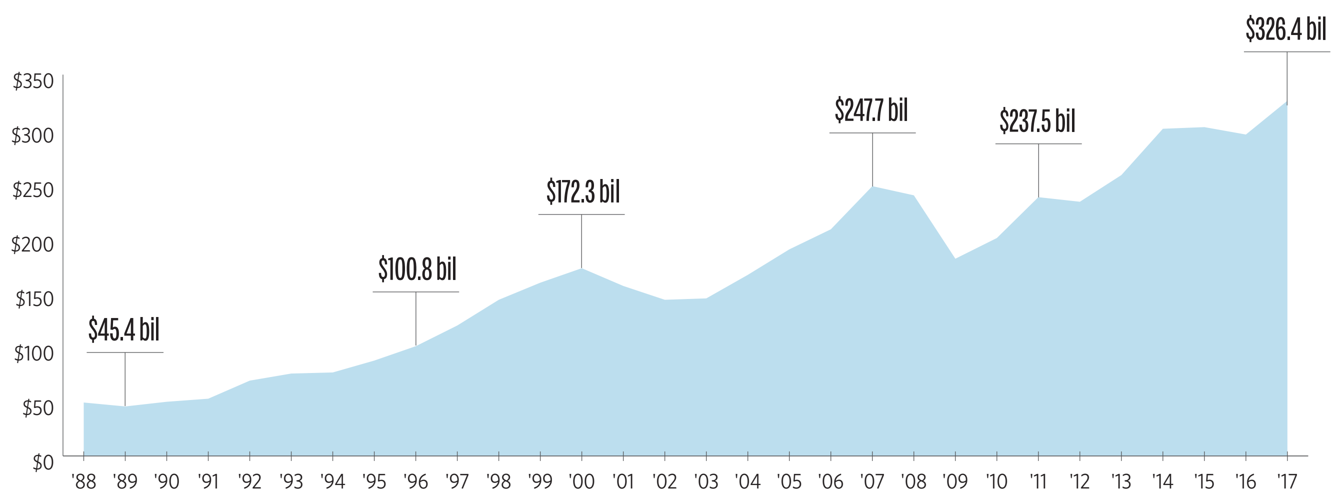
* *Net time-weighted rate of returns*

Discount Rate Changes

2017–18* (State)	7.5%	→ 7.375%
2018–19* (School/PA)	7.5%	→ 7.375%
2018–19* (State)	7.375%	→ 7.25%
2019–20* (School/PA)	7.375%	→ 7.25%
2019–20* (State)	7.25%	→ 7.0%
2020–21* (School/PA)	7.25%	→ 7.0%
2012	7.75%	→ 7.5%
2004	8.25%	→ 7.75%

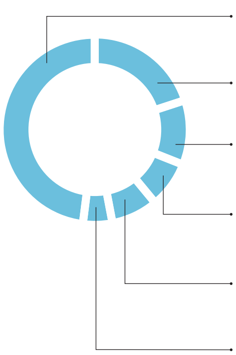
* *FY required contribution*

Total Fund Market Value 1988–2017 *(for FY end 6/30)*



Facts at a Glance is a compilation of information of interest to board members, staff, and the general public. Every effort has been made to verify the accuracy of the information, which is intended for general use only.

Current Asset Allocation



48.3% Global Equity
19.4% Global Fixed Income
11.2% Real Assets
8.0% Private Equity
7.8% Inflation Assets
5.3% Other:
4.8% Liquidity
0.5% Total Plan Level

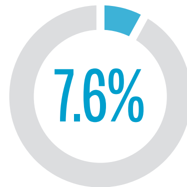
Asset Allocation

	Current Allocation	Strategic Asset Allocation *
Global Equity	48.3%	50.0%
Private Equity	8.0%	8.0%
Global Fixed Income	19.4%	28.0%
Real Assets	11.2%	13.0%
Liquidity	4.8%	1.0%
Inflation Assets	7.8%	—
Total Plan Level**	0.5%	—
Total Fund	**100.0%**	**100.0%**

* *Adopted on December 18, 2017; to be implemented July 1, 2018*

** *The Total Plan Level includes multi-asset class, transition and plan level portfolios. These assets do not have targets because they are not components of the Total Fund Policy benchmark.*

California Investments



$24.7 billion

California investments as percentage of the total fund

	Fair Value (in millions)
Total California Investments	**$24,653**
Global Equity	$10,621
Global Fixed Income	$3,931
Private Equity*	$1,970
Real Assets*	$8,131

* *As of March 31, 2017*

Sustainable Investing

CalPERS actively engages with the companies we own to **protect the long-term sustainability of our investment**. From issues regarding environmental responsibility to safe labor practices, we keep an open dialog with company leaders and vote our proxies.

11,400+ Number of proxy votes CalPERS cast in 2017 at companies worldwide

Pension Funding

Funded Status of Retirement Plans by Member Category*

	State	School	PA	Total
2015–16	**62.3%** **	**67.8%** **	**66.2%** **	**68.3%**
2014–15	69.4%	77.5%	74.5%	73.1%
2013–14	72.1%	82.0%	77.9%	76.3%
2012–13	66.1%	76.2%	70.5%	69.8%
2011–12	66.1%	75.4%	70.1%	69.6%

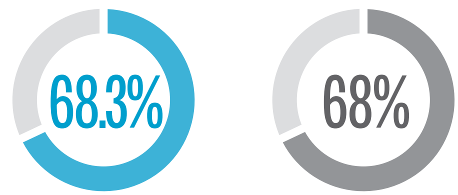
* *The funded ratio is calculated by the market value of assets in the fund to the liabilities for each retirement plan. The funded ratios are based on the market value of assets.*

** *Based on a 7.0% discount rate; does not include the 11.2% return for FY 2016-17.*

Contributions, 10-Year Review *(in thousands)*

	Employer Contributions	Member Contributions	Investment & Other Income
2016–17	**$12,329,837**	**$4,214,578**	**$32,977,020**
2015–16	10,892,489	4,015,754	1,548,442
2014–15	9,997,705	3,826,072	6,702,997
2013–14	8,777,602	3,775,038	45,598,044
2012–13	8,123,833	3,897,078	30,291,983
2011–12	7,772,913	3,598,437	(196,014)
2010–11	7,465,397	3,600,089	43,907,436
2009–10	6,955,049	3,378,867	25,577,529
2008–09	6,912,379	3,882,355	(57,363,899)
2007–08	7,424,802	3,512,075	(12,492.908)

Funded Status Total PERF*



2015–16**　　2016–17 estimate**

* *Public Employees' Retirement Fund (PERF)*

** *Based on a 7.0% discount rate; includes the 11.2% return for FY 2016-17.*

Total Employer Contributions

School districts
$1.8 billion / 14%

State of California
$5.5 billion / 45%

Public agencies
$5.1 billion / 41%

Shared Responsibility

Every dollar paid to CalPERS retirees comes from three sources:

Investment earnings
61¢

CalPERS employers
26¢

CalPERS members
13¢

Public Employees' Retirement Fund (PERF)

Overall Members

Total members	**1,925,459**
Retirees receiving a monthly allowance	576,512
Beneficiaries/survivors receiving a monthly allowance	91,547
Active members	887,220
Inactive members	370,180

All Retirees, Beneficiaries, Survivors

Average annual allowance	$32,604/yr
Average monthly allowance	$2,717/mo

All Retirees

Average annual allowance	$34,512/yr
Average monthly allowance	$2,876/mo
Average retirement age	58
Average years of service	19.8

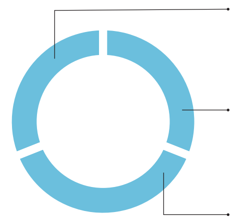
Service Retirements by Employer Type

	State	School	PA
Number of retirees	172,343	172,507	162,498
Average monthly service allowance	$3,428	$1,613	$3,674
Average retirement age	59	61	58
Average years of service	23	17	21

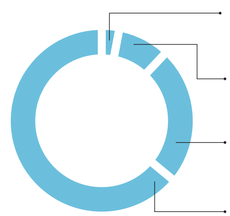
New Service Retirees by Employer Type

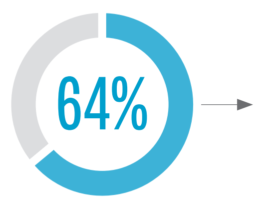
	State	School	PA	**Total**
2016-17	9,936	11,110	10,526	**31,572**
2015-16	10,442	10,180	9,821	**30,443**

Members by Employer Type



Average Monthly Allowance, All Service Retirees





< $3,000 a month

Percentage of all CalPERS service retirees receiving less than $3,000 a month

$2,876 Average monthly allowance, all retirees

$3,182 Average monthly allowance, all new retirees

33% Retirees who do not receive Social Security (as of June 30, 2016)

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Other Benefit Plans

Defined Contribution Plans

California Employers' Retiree Benefit Trust Fund (CERBT)

A multiple-employer trust fund dedicated to prefunding Other Post-Employment Benefits (OPEB) such as retiree health benefits to all eligible California public agencies.

Total assets	$7.1 billion
Total contracting agencies	524

500+ agencies

in the CERBT fund, since inception in FY 2007-08

CalPERS Deferred Compensation Plan

A deferred compensation retirement savings plan for public agency and school employers.

Total assets	$1.4 billion
Total participants	28,337
Total contracting agencies	785

Supplemental Contributions Plan

An after-tax supplemental contributions program for state employees and members of the Judges' Retirement System I and II.

Total assets	$121.6 million
Total participants	7,641

Defined Benefit Plans

Legislators' Retirement System (LRS)

The LRS is available to members of the California Legislature serving prior to November 7, 1990; all were elected constitutional officers and legislative statutory officers. This system was closed to Legislators after November 7, 1990, by virtue of an initiative passed by the electorate.

	Active Members	Inactive Members
Total	**8**	**6**
Members of the Legislature	1	3
Constitutional officers	7	3
Total retirees, survivors & beneficiaries		**230**

Judges' Retirement System (JRS)

The JRS provides benefits for State Supreme and Appellate Court justices, Superior Court judges, and Municipal Court judges who were appointed or elected before November 9, 1994.

Total	**201**
Active	198
Deferred	3
Total retirees, survivors & beneficiaries	**1,888**

Judges' Retirement System II (JRS II)

The JRS II provides benefits for State Supreme and Appellate Court justices, Superior Court judges, and Municipal Court judges who were appointed or elected after November 9, 1994.

Total active members	**1,508**
Total retirees, survivors & beneficiaries	**170**

Primary Factors Contributing to CalPERS Funded Status

LEAGUE® OF CALIFORNIA CITIES

CalPERS

Several factors have contributed to unsustainability of the CalPERS system. While such factors should be acknowledged, it remains far more important that all stakeholders work collaboratively to craft a path forward to ensure a sustainable public pension system that also recognizes the public's need for reliable and adequate services. Based on the League of California Cities® Retirement Sustainability Study Findings, anecdotal evidence, and in consulatation with Bartel Associates, the League has identified five primary factors.

1. **Enhanced Benefits:** The most prominent source of the pension system's cost escalation began with enhanced pension benefits granted by state and local government employers following the passage of SB 400 and AB 616 in 1999 and 2000. Cities throughout California followed the state's lead in providing enhanced benefits and, when negotiated, statute required those enhanced benefits apply to both prior and future service. These enhanced benefits have caused a ripple effect that have fundamentally altered the way in which local agencies can retain employees and provide basic and critical services to the public.

2. **Investment Losses:** Fallout from the Great Recession played a pivotal role in CalPERS' lackluster investment returns. In 2008, CalPERS suffered a negative 27 percent return on investment — factoring in the 2008 discount rate (7.75 percent) results in a gross 34.75 percent impact to the fund. Moreover, CalPERS' outside investment advisors expect returns over the next decade will also be below anticipated returns. CalPERS projects that the projected market rate assumptions will yield a 6.1 percent return for the fund over the next decade. While it is widely known that CalPERS determines its discount rate, using a 60-year blended return to calculate its discount rate — 6.1 percent is well below the 7 percent assumption. Under the current statutory paradigm, public employers will assume the liability associated with this shortfall.

3. **Cost of Living Adjustments:** Automatic Cost of living adjustments (COLA) have continued to hamper CalPERS' ability to compound investment earnings, hampering growth. ***A Sept. 27, 2017 Sacramento Bee article*** states "CalPERS in the past has looked at how suspending COLA's would affect the pension fund. Freezing them would improve pension plans for public safety employees by up to 18 percent and for other employees by up to 15 percent, according to CalPERS." This potentially significant gain in funded status should not be overlooked.

4. **CalPERS Contribution Policy:** CalPERS contribution policy, most notably after the Great Recession, did not require agencies pay interest on accrued unfunded liability. While this shift in policy was an attempt to ease the burden on employers, the policy resulted in pushing unfunded liability payments to future taxpayers.

5. **Demographics:** The liability for retirees at most cities significantly exceeds that of actives. This creates more volatility and led to having a much bigger impact funded status (and ultimately contributions) than any prior downturn.

California Public Employees' Retirement System
Actuarial Office
P.O. Box 942701
Sacramento, CA 94229-2701
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www.calpers.ca.gov

July 2017

MISCELLANEOUS PLAN OF THE UNION SANITARY DISTRICT (CalPERS ID: 6011550262)
Annual Valuation Report as of June 30, 2016

Dear Employer,

As an attachment to this letter, you will find a copy of the June 30, 2016 actuarial valuation report of your pension plan. Your 2016 actuarial valuation report contains important actuarial information about your pension plan at CalPERS. Your CalPERS staff actuary, whose signature appears in the "Actuarial Certification" section on page 1, is available to discuss the report with you after August 31, 2017.

Required Contributions

The exhibit below displays the minimum required employer contributions and the Employee PEPRA Rate for Fiscal Year 2018-19 along with estimates of the required contributions for Fiscal Years 2019-20 and 2020-21. Member contributions other than cost sharing (whether paid by the employer or the employee) are in addition to the results shown below. **The required employer contributions in this report do not reflect any cost sharing arrangement you may have with your employees.**

Fiscal Year	Employer Normal Cost Rate	Employer Amortization of Unfunded Accrued Liability	Employee PEPRA Rate
2018-19	9.368%	$2,648,073	6.25%
Projected Results			
2019-20	*9.8%*	*$3,220,000*	*TBD*
2020-21	*10.8%*	*$3,654,000*	*TBD*

The actual investment return for Fiscal Year 2016-17 was not known at the time this report was prepared. The projections above assume the investment return for that year would be 7.375 percent. ***If the actual investment return for Fiscal year 2016-17 differs from 7.375 percent, the actual contribution requirements for the projected years will differ from those shown above.***

Moreover, the projected results for Fiscal Years 2019-20 and 2020-21 also assume that there are no future plan changes, no further changes in assumptions other than those recently approved, and no liability gains or losses. Such changes can have a significant impact on required contributions. Since they cannot be predicted in advance, the projected employer results shown above are estimates. The actual required employer contributions for Fiscal year 2019-20 will be provided in next year's report.

For additional details regarding the assumptions and methods used for these projections please refer to the "Projected Employer Contributions" in the "Highlights and Executive Summary" section.

The required contributions shown above include a Normal Cost component expressed as a percentage of payroll and a payment toward Unfunded Accrued Liability expressed as a dollar amount. Actual contributions for Fiscal Year 2018-19 and all future years will be collected on that basis. For illustrative total contribution requirements expressed as percentages of payroll, please see pages 4 and 5 of the report.

The "Risk Analysis" section of the valuation report on page 21 also contains estimated employer contributions in future years under a variety of investment return scenarios.

Changes since the Prior Year's Valuation

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and to 7.00 percent the following year as adopted by the Board.

Beginning with Fiscal Year 2017-18 CalPERS began collecting employer contributions toward the plan's unfunded liability as dollar amounts instead of the prior method of a contribution rate. This change addresses potential funding issues that could arise from a declining payroll or reduction in the number of active members in the plan. Funding the unfunded liability as a percentage of payroll could lead to the underfunding of the plans. Due to stakeholder feedback regarding internal needs for total contributions expressed as a percentage of payroll, the reports have been modified to include such results in the contribution projection on page 5. These results are provided for information purposes only. Contributions toward the unfunded liability will continue to be collected as dollar amounts.

The CalPERS Board of Administration adopted a Risk Mitigation Policy which is designed to reduce funding risk over time. This Policy has been temporarily suspended during the period over which the discount rate is being lowered. More details on the Risk Mitigation Policy can be found on our website.

Besides the above noted changes, there may also be changes specific to the plan such as contract amendments and funding changes.

Further descriptions of general changes are included in the "Highlights and Executive Summary" section and in Appendix A, "Actuarial Methods and Assumptions." The effects of the changes on the required contributions are included in the "Reconciliation of Required Employer Contributions" section.

We understand that you might have a number of questions about these results. While we are very interested in discussing these results with your agency, in the interest of allowing us to give every public agency their results, we ask that you wait until after August 31 to contact us with actuarial questions. If you have other questions, you may call the Customer Contact Center at (888)-CalPERS or (**888-225-7377**).

Sincerely,

SCOTT TERANDO
Chief Actuary

ACTUARIAL VALUATION
as of June 30, 2016

for the
MISCELLANEOUS PLAN
of the
UNION SANITARY DISTRICT

(CalPERS ID: 6011550262)
(Rate Plan ID: 984)

REQUIRED CONTRIBUTIONS
FOR FISCAL YEAR
July 1, 2018 – June 30, 2019

TABLE OF CONTENTS

ACTUARIAL CERTIFICATION

To the best of our knowledge, this report is complete and accurate and contains sufficient information to disclose, fully and fairly, the funded condition of the MISCELLANEOUS PLAN OF THE UNION SANITARY DISTRICT. This valuation is based on the member and financial data as of June 30, 2016 provided by the various CalPERS databases and the benefits under this plan with CalPERS as of the date this report was produced. It is our opinion that the valuation has been performed in accordance with generally accepted actuarial principles, in accordance with standards of practice prescribed by the Actuarial Standards Board, and that the assumptions and methods are internally consistent and reasonable for this plan, as prescribed by the CalPERS Board of Administration according to provisions set forth in the California Public Employees' Retirement Law.

The undersigned is an actuary for CalPERS, a member of the American Academy of Actuaries and the Society of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

DAVID DU BOIS, FSA
Senior Pension Actuary, CalPERS

HIGHLIGHTS AND EXECUTIVE SUMMARY

- **INTRODUCTION**
- **PURPOSE OF THE REPORT**
- **REQUIRED CONTRIBUTIONS**
- **PLAN'S FUNDED STATUS**
- **PROJECTED EMPLOYER CONTRIBUTIONS**
- **COST**
- **CHANGES SINCE THE PRIOR YEAR'S VALUATION**
- **SUBSEQUENT EVENTS**

Introduction

This report presents the results of the June 30, 2016 actuarial valuation of the MISCELLANEOUS PLAN OF THE UNION SANITARY DISTRICT of the California Public Employees' Retirement System (CalPERS). This actuarial valuation sets the required employer contributions for Fiscal Year 2018-19.

Purpose of the Report

The actuarial valuation was prepared by the CalPERS Actuarial Office using data as of June 30, 2016. The purpose of the report is to:

- Set forth the assets and accrued liabilities of this plan as of June 30, 2016;
- Determine the required employer contributions for the fiscal year July 1, 2018 through June 30, 2019;
- Provide actuarial information as of June 30, 2016 to the CalPERS Board of Administration and other interested parties.

The pension funding information presented in this report should not be used in financial reports subject to Governmental Accounting Standards Board (GASB) Statement No. 68 for an Agent Employer Defined Benefit Pension Plan. A separate accounting valuation report for such purposes is available from CalPERS and details for ordering are available on our website.

The measurements shown in this actuarial valuation may not be applicable for other purposes. The employer should contact their actuary before disseminating any portion of this report for any reason that is not explicitly described above.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; changes in actuarial policies; and changes in plan provisions or applicable law.

California Actuarial Advisory Panel Recommendations

This report includes all the basic disclosure elements as described in the *Model Disclosure Elements for Actuarial Valuation Reports* recommended in 2011 by the California Actuarial Advisory Panel (CAAP), with the exception of including the original base amounts of the various components of the unfunded liability in the Schedule of Amortization Bases shown on page 15.

Additionally, this report includes the following "Enhanced Risk Disclosures" also recommended by the CAAP in the Model Disclosure Elements document:

- A "Deterministic Stress Test," projecting future results under different investment income scenarios
- A "Sensitivity Analysis," showing the impact on current valuation results using alternative discount rates of 6.0 percent, 7.0 percent and 8.0 percent.

Required Contributions

		Fiscal Year
Required Employer Contribution		**2018-19**
Employer Normal Cost Rate		**9.368%**
Plus Either		
1) Monthly Employer Dollar UAL Payment	**$**	**220,673**
Or		
2) Annual UAL Prepayment Option	**$**	**2,555,515**
Required PEPRA Member Contribution Rate		**6.25%**

*The total minimum required employer contribution is the **sum** of the Plan's Employer Normal Cost Rate (expressed as a percentage of payroll) **plus** the Employer Unfunded Accrued Liability (UAL) Contribution Amount (billed monthly in dollars).*

*Only the UAL portion of the employer contribution can be prepaid **(which must be received in full no later than July 31)**. Plan Normal Cost contributions will be made as part of the payroll reporting process. If there is contractual cost sharing or other change, this amount will change.*

§20572 of the Public Employees' Retirement Law assesses interest at an annual rate of 10 percent if a contracting agency fails to remit the required contributions when due.

For additional detail regarding the determination of the required contribution for PEPRA members, see Appendix D. Required member contributions for Classic members can be found in Appendix B.

		Fiscal Year		Fiscal Year
		2017-18		**2018-19**
Normal Cost Contribution as a Percentage of Payroll				
Total Normal Cost		16.684%		17.211%
Employee Contribution[1]		7.891%		7.843%
Employer Normal Cost		8.793%		9.368%
Projected Annual Payroll for Contribution Year	$	15,840,043	$	16,559,643
Estimated Employer Contributions Based On Projected Payroll				
Total Normal Cost	$	2,642,752	$	2,850,080
Employee Contribution[1]		1,249,938		1,298,773
Employer Normal Cost		1,392,814		1,551,307
Unfunded Liability Contribution		2,139,379		2,648,073
% of Projected Payroll (illustrative only)		13.506%		15.991%
Estimated Total Employer Contribution	$	3,532,193	$	4,199,380
% of Projected Payroll (illustrative only)		22.299%		25.359%

[1] For classic members, this is the percentage specified in the Public Employees Retirement Law, net of any reduction from the use of a modified formula or other factors. For PEPRA members, the member contribution rate is based on 50 percent of the normal cost. A development of PEPRA member contribution rates can be found in Appendix D. Employee cost sharing is not shown in this report.

Plan's Funded Status

	June 30, 2015	June 30, 2016
1. Present Value of Projected Benefits	$ 141,461,497	$ 151,917,431
2. Entry Age Normal Accrued Liability	123,680,195	131,997,730
3. Market Value of Assets (MVA)	$ 88,724,620	$ 86,950,874
4. Unfunded Accrued Liability (UAL) [(2) – (3)]	$ 34,955,575	$ 45,046,856
5. Funded Ratio [(3) / (2)]	71.7%	65.9%

This measure of funded status is an assessment of the need for future employer contributions based on the selected actuarial cost method used to fund the plan. The UAL is the present value of future employer contributions for service that has already been earned and is in addition to future normal cost contributions for active members. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Projected Employer Contributions

The table below shows the required and projected employer contributions (before cost sharing) for the next six fiscal years. Projected results reflect the adopted changes to the discount rate described in Appendix A, "Actuarial Methods and Assumptions." The projections also assume that all actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur during the projection period. The projected normal cost percentages in the projections below do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

	Required Contribution	**Projected Future Employer Contributions (Assumes 7.375% Return for Fiscal Year 2016-17)**					
Fiscal Year	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**
Normal Cost %	9.368%	9.8%	10.8%	10.8%	10.8%	10.8%	10.8%
UAL Payment	2,648,073	3,220,000	3,654,000	4,161,000	4,604,000	4,895,000	5,146,000
*Total as a % of Payroll**	*25.4%*	*28.7%*	*31.6%*	*33.8%*	*35.5%*	*36.3%*	*36.8%*
Projected Payroll	*16,559,643*	*17,056,433*	*17,568,126*	*18,095,170*	*18,638,025*	*19,197,166*	*19,773,081*

*Illustrative only and based on the projected payroll shown.

Changes in the UAL due to actuarial gains or losses as well as changes in actuarial assumptions or methods are amortized using a 5-year ramp up. For more information, please see "Amortization of the Unfunded Actuarial Accrued Liability" under "Actuarial Methods" in Appendix A. This method phases in the impact of unanticipated changes in UAL over a 5-year period and attempts to minimize employer cost volatility from year to year. As a result of this methodology, dramatic changes in the required employer contributions in any one year are less likely. However, required contributions can change gradually and significantly over the next five years. In years where there is a large increase in UAL the relatively small amortization payments during the ramp up period could result in a funded ratio that is projected to decrease initially while the contribution impact of the increase in the UAL is phased in.

Due to the adopted changes in the discount rate for the next two valuations in combination with the 5-year phase-in ramp, the increases in the required contributions are expected to continue for seven years from Fiscal Year 2018-19 through Fiscal Year 2024-25.

For projected contributions under alternate investment return scenarios, please see the "Analysis of Future Investment Return Scenarios" in the "Risk Analysis" section.

Cost

Actuarial Cost Estimates in General

What is the cost of the pension plan?

Contributions to fund the pension plan are comprised of two components:

- The Normal Cost, expressed as a percentage of total active payroll.
- The Amortization of the Unfunded Accrued Liability (UAL), expressed as a dollar amount.

For fiscal years prior to FY 2017-18, the Amortizations of UAL component was expressed as percentage of total active payroll. Starting with FY 2017-18, the Amortization of UAL component will be expressed as a dollar amount and will be invoiced on a monthly basis. There will be an option to prepay this amount during July of each fiscal year.

The Normal Cost component will continue to be expressed as a percentage of active payroll with employer and employee contributions payable as part of the regular payroll reporting process.

The determination of both components requires complex actuarial calculations. The calculations are based on a set of actuarial assumptions which can be divided into two categories:

- Demographic assumptions (which includes mortality rates, retirement rates, employment termination rates, disability rates)
- Economic assumptions (which includes future investment earnings, inflation, salary growth rates)

These assumptions reflect CalPERS best estimate of the future experience of the plan and are long term in nature. We recognize that all the assumptions will not be realized in any given year. For example, the investment earnings at CalPERS have averaged 7.0 percent over the 20 years ending June 30, 2016, yet individual fiscal year returns have ranged from -24 percent to +21.7 percent. In addition, CalPERS reviews all the actuarial assumptions on an ongoing basis by conducting in depth experience studies every four years.

Changes since the Prior Year's Valuation

Benefits

The standard actuarial practice at CalPERS is to recognize mandated legislative benefit changes in the first annual valuation following the effective date of the legislation. Voluntary benefit changes by plan amendment are generally included in the first valuation that is prepared after the amendment becomes effective, even if the valuation date is prior to the effective date of the amendment.

This valuation generally reflects plan changes by amendments effective before the date of the report. Please refer to the "Plan's Major Benefit Options" and Appendix B for a summary of the plan provisions used in this valuation. The effect of any mandated benefit changes or plan amendments on the unfunded liability is shown in the "(Gain)/Loss Analysis" and the effect on the employer contribution is shown in the "Reconciliation of Required Employer Contributions." It should be noted that no change in liability or contribution is shown for any plan changes which were already included in the prior year's valuation.

Actuarial Methods and Assumptions

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and 7.00 percent the following year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate assumption provides a more realistic assumption for the long term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this three year discount rate schedule. A comprehensive analysis of all actuarial assumptions and methods including the discount rate will be conducted in 2017.

Subsequent Events

The contribution requirements determined in this actuarial valuation report are based on demographic and financial information as of June 30, 2016. Changes in the value of assets subsequent to that date are not reflected. Declines in asset values will increase the required contribution, while investment returns above the assumed rate of return will decrease the actuarial cost of the plan.

This actuarial valuation report reflects statutory changes, regulatory changes and CalPERS Board actions through January 2017. Any subsequent changes or actions are not reflected.

ASSETS

- **RECONCILIATION OF THE MARKET VALUE OF ASSETS**
- **ASSET ALLOCATION**
- **CALPERS HISTORY OF INVESTMENT RETURNS**

Reconciliation of the Market Value of Assets

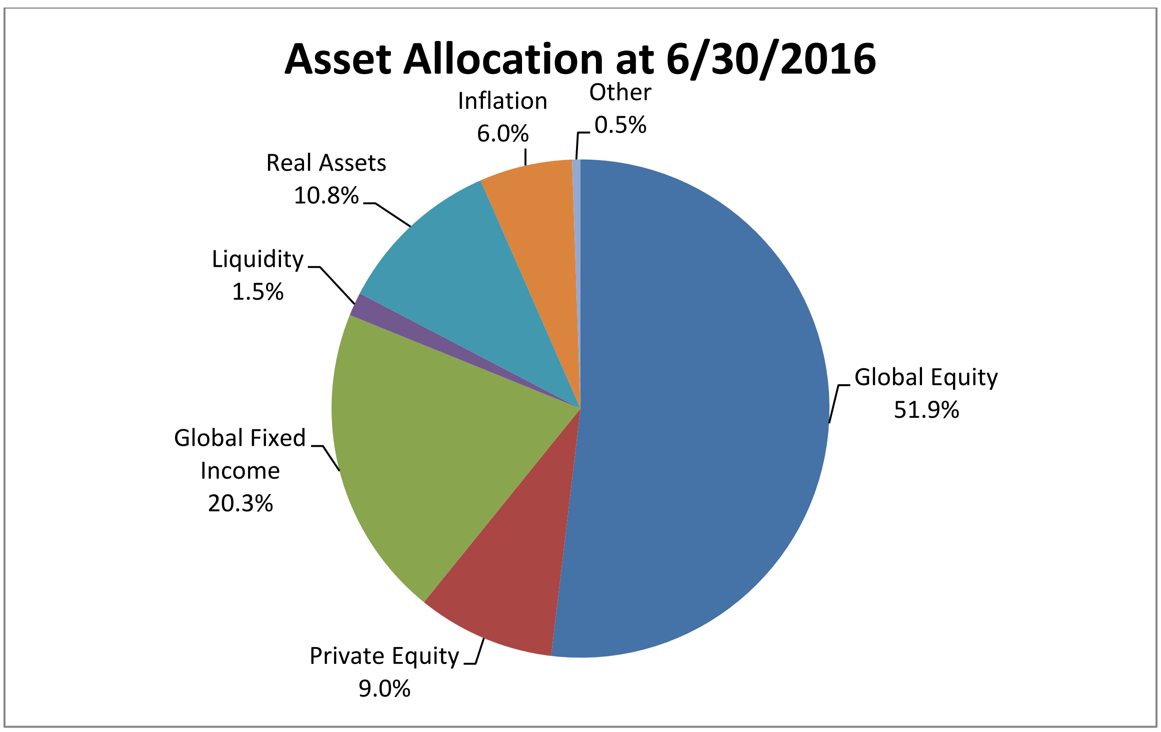
1.	Market Value of Assets as of 6/30/15 including Receivables	$	88,724,620
2.	Change in Receivables for Service Buybacks		(76,267)
3.	Employer Contributions		2,770,226
4.	Employee Contributions		1,175,546
5.	Benefit Payments to Retirees and Beneficiaries		(6,119,731)
6.	Refunds		(2,833)
7.	Lump Sum Payments		0
8.	Transfers and Miscellaneous Adjustments		106,631
9.	Net Investment Return		372,682
10.	Market Value of Assets as of 6/30/16 including Receivables	$	86,950,874

Asset Allocation

CalPERS adheres to an Asset Allocation Strategy which establishes asset class allocation policy targets and ranges, and manages those asset class allocations within their policy ranges. CalPERS Investment Belief No. 6 recognizes that strategic asset allocation is the dominant determinant of portfolio risk and return. On February 19, 2014, the CalPERS Board of Administration adopted changes to the current asset allocation as shown in the Policy Target Allocation below expressed as a percentage of total assets.

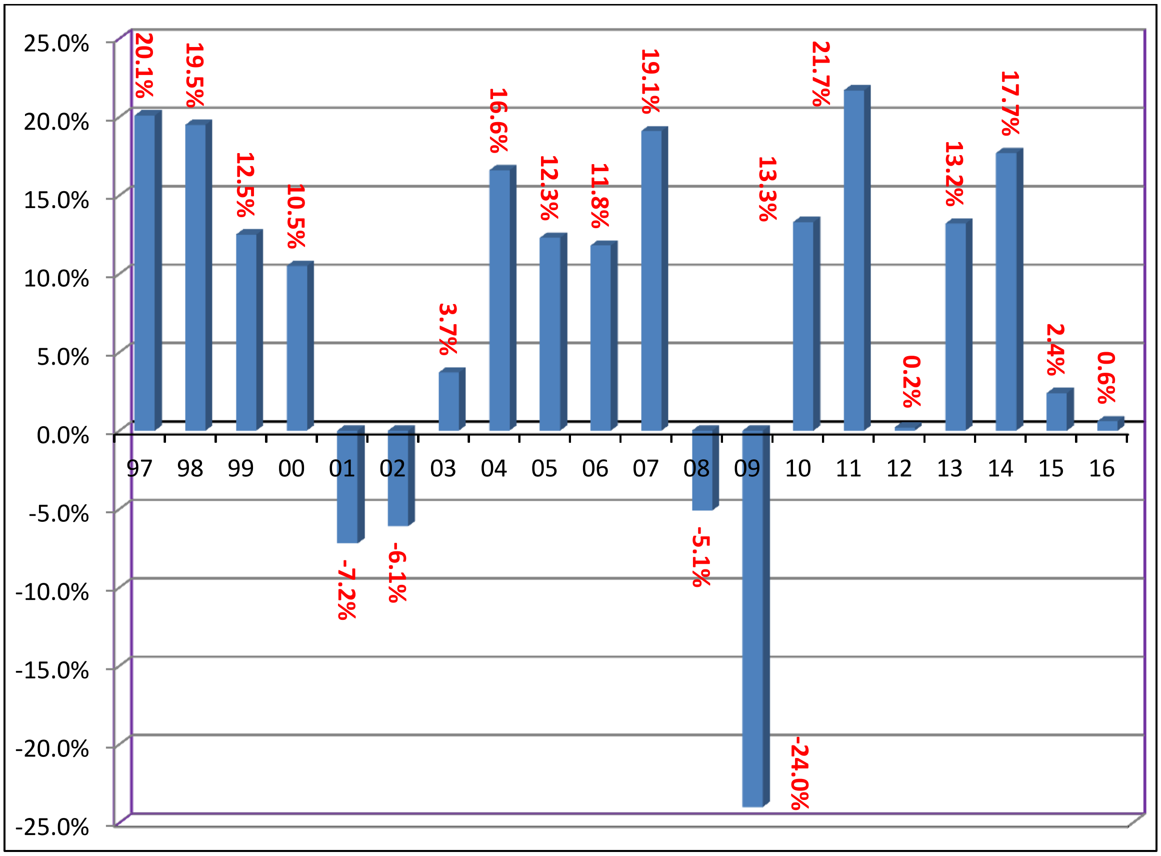
The asset allocation and market value of assets shown below reflect the values of the Public Employees' Retirement Fund (PERF) in its entirety as of June 30, 2016. The assets for UNION SANITARY DISTRICT MISCELLANEOUS PLAN are part of the PERF and are invested accordingly.

(A) Asset Class	(B) Market Value ($ Billion)	(C) Policy Target Allocation
Public Equity	153.1	51.0%
Private Equity	26.4	10.0%
Global Fixed Income	59.9	20.0%
Liquidity	4.5	1.0%
Real Assets	31.8	12.0%
Inflation Sensitive Assets	17.8	6.0%
Other	1.6	0.0%
Total Fund	**$295.1**	**100.0%**



CalPERS History of Investment Returns

The following is a chart with the 20-year historical annual returns of the Public Employees Retirement Fund for each fiscal year ending on June 30. Beginning in 2002, the figures are reported as gross of fees.



The table below shows historical geometric mean annual returns of the Public Employees Retirement Fund for various time periods ending on June 30, 2016, (figures are reported as gross of fees). The geometric mean rate of return is the average rate per period compounded over multiple periods. It should be recognized that in any given year the rate of return is volatile. The portfolio has an expected volatility of 11.8 percent per year based on the most recent Asset Liability Modelling study. The volatility is a measure of the risk of the portfolio expressed in the standard deviation of the fund's total return distribution, expressed as a percentage. Consequently, when looking at investment returns, it is more instructive to look at returns over longer time horizons.

History of CalPERS Geometric Mean Rates of Return and Volatilities

	1 year	**5 year**	**10 year**	**20 year**	**30 year**
Geometric Return	0.6%	6.6%	5.0%	7.0%	8.2%
Volatility	–	8.1%	14.0%	11.8%	10.1%

LIABILITIES AND CONTRIBUTIONS

- **DEVELOPMENT OF ACCRUED AND UNFUNDED LIABILITIES**
- **(GAIN) / LOSS ANALYSIS 06/30/15 - 06/30/16**
- **SCHEDULE OF AMORTIZATION BASES**
- **30-YEAR AMORTIZATION SCHEDULES AND ALTERNATIVES**
- **RECONCILIATION OF REQUIRED EMPLOYER CONTRIBUTIONS**
- **EMPLOYER CONTRIBUTION HISTORY**
- **FUNDING HISTORY**

Development of Accrued and Unfunded Liabilities

		June 30, 2015	June 30, 2016
1. Present Value of Projected Benefits			
a) Active Members	$	64,083,513	66,194,337
b) Transferred Members		4,826,356	5,028,152
c) Terminated Members		1,065,723	1,141,308
d) Members and Beneficiaries Receiving Payments		71,485,905	79,553,634
e) Total	$	141,461,497	151,917,431
2. Present Value of Future Employer Normal Costs	$	9,161,810	10,639,069
3. Present Value of Future Employee Contributions	$	8,619,492	9,280,632
4. Entry Age Normal Accrued Liability			
a) Active Members [(1a) - (2) - (3)]	$	46,302,211	46,274,636
b) Transferred Members (1b)		4,826,356	5,028,152
c) Terminated Members (1c)		1,065,723	1,141,308
d) Members and Beneficiaries Receiving Payments (1d)		71,485,905	79,553,634
e) Total	$	123,680,195	131,997,730
5. Market Value of Assets (MVA)	$	88,724,620	86,950,874
6. Unfunded Accrued Liability (UAL) [(4e) - (5)]	$	34,955,575	45,046,856
7. Funded Ratio [(5) / (4e)]		71.7%	65.9%

(Gain)/Loss Analysis 6/30/15 – 6/30/16

To calculate the cost requirements of the plan, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year, actual experience is compared to the expected experience based on the actuarial assumptions. This results in actuarial gains or losses, as shown below.

1. Total (Gain)/Loss for the Year		
a) Unfunded Accrued Liability (UAL) as of 6/30/15	$	34,955,575
b) Expected Payment on the UAL during 2015-16		1,469,933
c) Interest through 6/30/16 [.075 x (1a) - (($(1.075)^{1/2}$ - 1) x (1b)]		2,567,542
d) Expected UAL before all other changes [(1a) - (1b) + (1c)]		36,053,184
e) Change due to plan changes		0
f) Change due to assumption change		1,883,770
g) Expected UAL after all other changes [(1d) + (1e) + (1f)]		37,936,954
h) Actual UAL as of 6/30/16		45,046,856
i) Total (Gain)/Loss for 2015-16 [(1h) - (1g)]	$	7,109,902
2. Contribution (Gain)/Loss for the Year		
a) Expected Contribution (Employer and Employee)	$	3,949,036
b) Interest on Expected Contributions		145,412
c) Actual Contributions		3,945,772
d) Interest on Actual Contributions		145,291
e) Expected Contributions with Interest [(2a) + (2b)]		4,094,448
f) Actual Contributions with Interest [(2c) + (2d)]		4,091,063
g) Contribution (Gain)/Loss [(2e) - (2f)]	$	3,385
3. Asset (Gain)/Loss for the Year		
a) Market Value of Assets as of 6/30/15	$	88,724,620
b) Prior Fiscal Year Receivables		(490,898)
c) Current Fiscal Year Receivables		414,631
d) Contributions Received		3,945,772
e) Benefits and Refunds Paid		(6,122,564)
f) Transfers and Miscellaneous Adjustments		106,631
g) Expected Int. [.075 x (3a + 3b) + (($(1.075)^{1/2}$ - 1) x ((3d) + (3e) + (3f))]		6,541,302
h) Expected Assets as of 6/30/16 [(3a) + (3b) + (3c) + (3d) + (3e) + (3f) + (3g)]		93,119,494
i) Market Value of Assets as of 6/30/16		86,950,874
j) Asset (Gain)/Loss [(3h) - (3i)]	$	6,168,620
4. Liability (Gain)/Loss for the Year		
a) Total (Gain)/Loss (1i)	$	7,109,902
b) Contribution (Gain)/Loss (2g)		3,385
c) Asset (Gain)/Loss (3j)		6,168,620
d) Liability (Gain)/Loss [(4a) - (4b) - (4c)]	$	937,897

Schedule of Amortization Bases

There is a two-year lag between the valuation date and the start of the contribution fiscal year.

- The assets, liabilities, and funded status of the plan are measured as of the valuation date: June 30, 2016.
- The required employer contributions determined by the valuation are for the fiscal year beginning two years after the valuation date: Fiscal Year 2018-19.

This two-year lag is necessary due to the amount of time needed to extract and test the membership and financial data, and the need to provide public agencies with their required employer contribution well in advance of the start of the fiscal year.

The Unfunded Accrued Liability (UAL) is used to determine the employer contribution and therefore must be rolled forward two years from the valuation date to the first day of the fiscal year for which the contribution is being determined. The UAL is rolled forward each year by subtracting the expected payment on the UAL for the fiscal year and adjusting for interest. The expected payment on the UAL for a fiscal year is equal to the Expected Employer Contribution for the fiscal year minus the Expected Normal Cost for the year. The Employer Contribution for the first fiscal year is determined by the actuarial valuation two years ago and the contribution for the second year is from the actuarial valuation one year ago. The Normal Cost Rate for each of the two fiscal years is assumed to be the same as the rate determined by the current valuation. All expected dollar amounts are determined by multiplying the rate by the expected payroll for the applicable fiscal year, based on payroll as of the valuation date.

Reason for Base	Date Established	Amortization Period	Balance 6/30/16	Expected Payment 2016-17	Balance 6/30/17	Expected Payment 2017-18	Balance 6/30/18	Scheduled Payment for 2018-19
ASSUMPTION CHANGE	06/30/03	7	$1,526,905	$207,451	$1,424,550	$213,674	$1,308,197	$218,636
METHOD CHANGE	06/30/04	8	$(223,431)	$(27,871)	$(211,029)	$(28,707)	$(196,845)	$(29,359)
ASSUMPTION CHANGE	06/30/09	13	$4,944,081	$453,222	$4,839,070	$466,818	$4,712,225	$476,302
SPECIAL (GAIN)/LOSS	06/30/09	23	$2,341,351	$154,750	$2,353,671	$159,393	$2,362,088	$161,933
SPECIAL (GAIN)/LOSS	06/30/10	24	$1,412,074	$91,331	$1,421,576	$94,071	$1,428,939	$95,533
ASSUMPTION CHANGE	06/30/11	15	$2,109,513	$177,223	$2,081,448	$182,539	$2,045,804	$186,078
SPECIAL (GAIN)/LOSS	06/30/11	25	$(849,074)	$(53,813)	$(855,931)	$(55,427)	$(861,622)	$(56,267)
PAYMENT (GAIN)/LOSS	06/30/12	26	$(35,177)	$(2,187)	$(35,505)	$(2,253)	$(35,789)	$(2,286)
(GAIN)/LOSS	06/30/12	26	$5,885,078	$365,935	$5,939,914	$376,913	$5,987,418	$382,480
(GAIN)/LOSS	06/30/13	27	$14,226,596	$388,716	$14,873,013	$600,566	$15,347,579	$812,816
ASSUMPTION CHANGE	06/30/14	18	$7,095,225	$135,148	$7,478,455	$278,404	$7,741,503	$425,389
(GAIN)/LOSS	06/30/14	28	$(7,975,114)	$(112,170)	$(8,447,046)	$(231,071)	$(8,830,575)	$(351,602)
(GAIN)/LOSS	06/30/15	29	$5,595,155	$9,575	$5,997,876	$84,459	$6,352,701	$171,218
ASSUMPTION CHANGE	06/30/16	20	$1,883,770	$(69,772)	$2,094,997	$(71,866)	$2,323,972	$43,804
(GAIN)/LOSS	06/30/16	30	$7,109,904	$14,286	$7,619,456	$0	$8,181,391	$113,398
TOTAL			**$45,046,856**	**$1,731,824**	**$46,574,512**	**$2,067,513**	**$47,866,986**	**$2,648,073**

30-Year Amortization Schedule and Alternatives

The amortization schedule on the previous page shows the minimum contributions required according to CalPERS amortization policy. There has been considerable interest from many agencies in paying off these unfunded accrued liabilities sooner and the possible savings in doing so. As a result, we have provided alternate amortization schedules to help analyze the current amortization schedule and illustrate the advantages of accelerating unfunded liability payments.

Shown on the following page are future year amortization payments based on 1) the current amortization schedule reflecting the individual bases and remaining periods shown on the previous page, and 2) alternate "fresh start" amortization schedules using two sample periods that would both result in interest savings relative to the current amortization schedule. Note that the payments under each alternate scenario increase by 3 percent per year. **The schedules do not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2016. Therefore, future amortization payments displayed in the Current Amortization Schedule on the following page will not match projected amortization payments shown in connection with Projected Employer Contributions provided elsewhere in this report.**

The Current Amortization Schedule typically contains individual bases that are both positive and negative. Positive bases result from plan changes, assumption changes or plan experience that result in increases to unfunded liability. Negative bases result from plan changes, assumption changes or plan experience that result in decreases to unfunded liability. The combination of positive and negative bases within an amortization schedule can result in unusual or problematic circumstances in future years such as:

- A positive total unfunded liability with a negative total payment,
- A negative total unfunded liability with a positive total payment, or
- Total payments that completely amortize the unfunded liability over a very short period of time

In any year where one of the above scenarios occurs, the actuary will consider corrective action such as replacing the existing unfunded liability bases with a single "fresh start" base and amortizing it over a reasonable period.

The Current Amortization Schedule on the following page may appear to show that, based on the current amortization bases, one of the above scenarios will occur at some point in the future. It is impossible to know today whether such a scenario will in fact arise since there will be additional bases added to the amortization schedule in each future year. Should such a scenario arise in any future year, the actuary will take appropriate action based on guidelines in the CalPERS amortization policy. For purposes of this display, total payments include any negative payments. Therefore, the amount of estimated savings may be understated to the extent that negative payments appear in the current schedule.

30-Year Amortization Schedule and Alternatives

			Alternate Schedules			
	Current Amortization Schedule*		20 Year Amortization		15 Year Amortization	
Date	**Balance**	**Payment**	**Balance**	**Payment**	**Balance**	**Payment**
6/30/2018	47,866,986	2,648,073	47,866,986	3,578,176	47,866,986	4,353,782
6/30/2019	48,653,190	3,212,244	47,689,401	3,685,522	46,885,704	4,484,395
6/30/2020	48,912,775	3,592,304	47,387,487	3,796,087	45,696,709	4,618,927
6/30/2021	48,797,680	3,965,400	46,948,736	3,909,970	44,280,621	4,757,495
6/30/2022	48,287,486	4,261,294	46,359,619	4,027,269	42,616,510	4,900,220
6/30/2023	47,433,053	4,389,133	45,605,508	4,148,087	40,681,776	5,047,226
6/30/2024	46,383,137	4,520,806	44,670,587	4,272,530	38,452,025	5,198,643
6/30/2025	45,119,347	4,387,536	43,537,766	4,400,706	35,900,928	5,354,602
6/30/2026	43,900,450	4,556,354	42,188,581	4,532,727	33,000,080	5,515,241
6/30/2027	42,416,727	4,693,042	40,603,091	4,668,709	29,718,839	5,680,698
6/30/2028	40,681,941	4,833,836	38,759,764	4,808,770	26,024,156	5,851,119
6/30/2029	38,673,323	4,978,849	36,635,357	4,953,033	21,880,396	6,026,652
6/30/2030	36,366,302	5,128,215	34,204,787	5,101,624	17,249,144	6,207,452
6/30/2031	33,734,362	4,582,595	31,440,990	5,254,673	12,088,988	6,393,675
6/30/2032	31,473,699	4,505,594	28,314,771	5,412,313	6,355,302	6,585,486
6/30/2033	29,126,100	4,129,946	24,794,644	5,574,682		
6/30/2034	26,994,623	3,956,011	20,846,656	5,741,923		
6/30/2035	24,886,180	3,767,922	16,434,207	5,914,180		
6/30/2036	22,817,144	3,564,987	11,517,843	6,091,606		
6/30/2037	20,805,800	3,595,129	6,055,046	6,274,354		
6/30/2038	18,614,886	3,623,866				
6/30/2039	16,232,614	3,732,581				
6/30/2040	13,561,997	3,844,559				
6/30/2041	10,578,390	3,239,264				
6/30/2042	8,001,958	2,967,417				
6/30/2043	5,517,207	2,814,932				
6/30/2044	3,007,214	1,464,806				
6/30/2045	1,711,135	875,659				
6/30/2046	929,955	714,762				
6/30/2047	257,890	267,231				
Totals		**106,814,347**		**96,146,941**		**80,975,613**
Interest Paid		**58,947,361**		**48,279,955**		**33,108,627**
Estimated Savings				**10,667,406**		**25,838,734**

* This schedule does not reflect the impact of adopted discount rate changes that will become effective beyond June 30, 2016. For Projected Employer Contributions, please see Page 5.

Reconciliation of Required Employer Contributions

Normal Cost (% of Payroll)

1. For Period 7/1/17 – 6/30/18	
a) Employer Normal Cost	8.793%
b) Employee Contribution	7.891%
c) Total Normal Cost	16.684%
2. Changes since the prior year annual valuation	
a) Effect of changes in demographics results	0.080%
b) Effect of plan changes	0.000%
c) Effect of changes in assumptions	0.447%
d) Net effect of the changes above [sum of (a) through (c)]	0.527%
3. For Period 7/1/18 – 6/30/19	
a) Employer Normal Cost	9.368%
b) Employee Contribution	7.843%
c) Total Normal Cost	17.211%
Employer Normal Cost Change [(3a) – (1a)]	0.575%
Employee Contribution Change [(3b) – (1b)]	(0.048%)

Unfunded Liability Contribution ($)

1. For Period 7/1/17 – 6/30/18	2,139,379
2. Changes since the prior year annual valuation	
a) Effect of (gain)/loss during prior year[1]	113,398
b) Effect of plan changes	0
c) Effect of changes in assumptions[2]	43,804
d) Changes to prior year amortization payments[3]	351,492
e) Effect of changes due to Fresh Start	0
f) Effect of elimination of amortization base	0
g) Net effect of the changes above [sum of (a) through (f)]	508,694
3. For Period 7/1/18 – 6/30/19 [(1)+(2g)]	2,648,073

[1] The unfunded liability contribution for the (gain)/loss during the year prior to the valuation date is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[2] The unfunded liability contribution for the change in assumptions is 20 percent of the "full" annual requirement due to the 5-year ramp. Increases to this amount that occur during the ramp period will be included in line d) in future years.

[3] Includes changes due to 5-year ramp, payroll growth assumption, and re-amortization under new discount rate.

The amounts shown for the period 7/1/17 – 6/30/18 may be different if a prepayment of unfunded actuarial liability is made or a plan change became effective after the prior year's actuarial valuation was performed.

Employer Contribution History

The table below provides a recent history of the required employer contributions for the plan, as determined by the annual actuarial valuation. It does not account for prepayments or benefit changes made during a fiscal year.

	Required By Valuation		
Fiscal Year	**Employer Normal Cost**	**Unfunded Rate**	**Unfunded Liability Payment ($)**
2013 - 14	8.367%	8.032%	N/A
2014 - 15	8.389%	9.021%	N/A
2015 - 16	8.361%	10.197%	N/A
2016 - 17	8.608%	11.754%	N/A
2017 - 18	8.793%	N/A	2,139,379
2018 - 19	9.368%	N/A	2,648,073

Funding History

The table below shows the recent history of the actuarial accrued liability, the market value of assets, the funded ratio and the annual covered payroll.

Valuation Date	Accrued Liability	Market Value of Assets (MVA)	Unfunded Liability	Funded Ratio	Annual Covered Payroll
06/30/11	$ 94,015,409	$ 68,869,888	$ 25,145,521	73.3%	$ 12,767,707
06/30/12	98,458,686	67,951,375	30,507,311	69.0%	13,063,048
06/30/13	104,969,799	76,215,351	28,754,448	72.6%	13,595,469
06/30/14	117,459,514	88,570,710	28,888,804	75.4%	13,841,577
06/30/15	123,680,195	88,724,620	34,955,575	71.7%	14,495,883
06/30/16	131,997,730	86,950,874	45,046,856	65.9%	15,154,419

RISK ANALYSIS

- ANALYSIS OF FUTURE INVESTMENT RETURN SCENARIOS
- ANALYSIS OF DISCOUNT RATE SENSITIVITY
- VOLATILITY RATIOS
- HYPOTHETICAL TERMINATION LIABILITY

Analysis of Future Investment Return Scenarios

Analysis was performed to determine the effects of various future investment returns on required employer contributions. The projections below provide a range of results based on five investment return scenarios assumed to occur during the next four fiscal years (2016-17, 2017-18, 2018-19 and 2019-20). The projections also assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur.

Each of the five investment return scenarios assumes a return of 7.375 percent for fiscal year 2016-17. For fiscal years 2017-18, 2018-19, and 2019-20 each scenario assumes an alternate fixed annual return. The fixed return assumptions for the five scenarios are -3.0 percent, 3.0 percent, 7.0 percent (7.25 percent for 2017-18), 11.0 percent and 17.0 percent.

The alternate investment returns were chosen based on stochastic analysis of possible future investment returns over the four year period ending June 30, 2020. Using the expected returns and volatility of the asset classes in which the funds are invested, we produced ten thousand stochastic outcomes for this period. We then selected annual returns that approximate the 5th, 25th, 50th, 75th, and 95th percentiles for these outcomes. For example, of all of the 4-year outcomes generated in the stochastic analysis, approximately 25 percent of them had an average annual return of 3.0 percent or less.

Required contributions outside of this range are also possible. In particular, while it is unlikely that investment returns will average less than -3.0 percent or greater than 17.0 percent over this four year period, the possibility of a single investment return less than -3.0 percent or greater than 17.0 percent in any given year is much greater.

Assumed Annual Return From 2017-18 through 2019-20	**Projected Employer Contributions**			
	2019-20	**2020-21**	**2021-22**	**2022-23**
(3.0%)				
Normal Cost	9.8%	10.8%	10.8%	10.8%
UAL Contribution	$3,220,000	$3,794,000	$4,581,000	$5,445,000
3.0%				
Normal Cost	9.8%	10.8%	10.8%	10.8%
UAL Contribution	$3,220,000	$3,712,000	$4,337,000	$4,960,000
Assumed Discount Rate				
Normal Cost	9.8%	10.8%	10.8%	10.8%
UAL Contribution	$3,220,000	$3,654,000	$4,161,000	$4,604,000
11.0%				
Normal Cost	9.8%	10.8%	11.0%	11.3%
UAL Contribution	$3,220,000	$3,602,000	$3,992,000	$4,258,000
17.0%				
Normal Cost	9.8%	10.8%	11.5%	12.2%
UAL Contribution	$3,220,000	$3,520,000	$3,723,000	$3,709,000

Given the temporary suspension of the Risk Mitigation Policy during the period over which the discount rate assumption is being phased down to 7.0 percent, the projections above were performed without reflection of any possible impact of this Policy for Fiscal Years 2019-20 and 2020-21.

The projected normal cost percentages do not reflect that the normal cost will decline over time as new employees are hired into PEPRA or other lower cost benefit tiers.

Analysis of Discount Rate Sensitivity

Shown below are various valuation results as of June 30, 2016 assuming alternate discount rates. Results are shown using the current discount rate of 7.375 percent as well as alternate discount rates of 6.0 percent, 7.0 percent, and 8.0 percent. The alternate rate of 7.0 percent was selected since the Board has adopted this rate as the final discount rate at the end of the three year phase-in of the reduction in this assumption. The rates of 6.0 percent and 8.0 percent were selected since they illustrate the impact of a 1 percent increase or decrease to the 7.0 percent assumption. This analysis shows the potential plan impacts if the PERF were to realize investment returns of 6.0 percent, 7.0 percent, or 8.0 percent over the long-term.

This type of analysis gives the reader a sense of the long-term risk to required contributions. For a measure of funded status that is appropriate for assessing the sufficiency of plan assets to cover estimated termination liabilities, please see "Hypothetical Termination Liability" in the "Risk Analysis" section.

Sensitivity Analysis				
As of June 30, 2016	**Plan's Normal Cost**	**Accrued Liability**	**Unfunded Accrued Liability**	**Funded Status**
7.375% (current discount rate)	17.211%	$131,997,730	$45,046,856	65.9%
6.0%	23.286%	$155,857,708	$68,906,834	55.8%
7.0%	18.650%	$137,913,003	$50,962,129	63.0%
8.0%	15.113%	$122,987,643	$36,036,769	70.7%

Volatility Ratios

The actuarial calculations supplied in this communication are based on a number of assumptions about long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise required employer contributions from one year to the next. Therefore, employer contributions will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio (AVR)

Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 4. Shown below is the asset volatility ratio, a measure of the plan's current volatility. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio (LVR)

Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return and changes in liability. For example, a plan with a liability-to-payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability-to-payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility. The asset volatility ratio, described above, will tend to move closer to the liability volatility ratio as the plan matures. Since the liability volatility ratio is a long-term measure, it is shown below at the current discount rate (7.375 percent) as well as the discount rate the Board has adopted to determine the contribution requirement in the June 30, 2018 actuarial valuation (7.00 percent).

Contribution Volatility		As of June 30, 2016
1. Market Value of Assets without Receivables	$	86,536,243
2. Payroll		15,154,419
3. Asset Volatility Ratio (AVR) [(1) / (2)]		5.7
4. Accrued Liability (7.375% discount rate)	$	131,997,730
5. Liability Volatility Ratio (LVR) [(4) / (2)]		8.7
6. Accrued Liability (7.00% discount rate)		137,913,003
7. Projected Liability Volatility Ratio [(6) / (2)]		9.1

Hypothetical Termination Liability

The hypothetical termination liability is an estimate of the financial position of the plan had the contract with CalPERS been terminated as of June 30, 2016. The plan liability on a termination basis is calculated differently compared to the plan's ongoing funding liability. For this hypothetical termination liability calculation, both compensation and service are frozen as of the valuation date and no future pay increases or service accruals are assumed. This measure of funded status is not appropriate for assessing the need for future employer contributions in the case of an ongoing plan, that is, for an employer that continues to provide CalPERS retirement benefits to active employees.

A more conservative investment policy and asset allocation strategy was adopted by the CalPERS Board for the Terminated Agency Pool. The Terminated Agency Pool has limited funding sources since no future employer contributions will be made. Therefore, expected benefit payments are secured by risk-free assets and benefit security for members is increased while limiting the funding risk. However, this asset allocation has a lower expected rate of return than the PERF and consequently, a lower discount rate assumption. The lower discount rate for the Terminated Agency Pool results in higher liabilities for terminated plans.

The effective termination discount rate will depend on actual market rates of return for risk-free securities on the date of termination. As market discount rates are variable the table below shows a range for the hypothetical termination liability based on the lowest and highest interest rates observed during an approximate 2-year period centered around the valuation date.

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 1.75%	Funded Status	Unfunded Termination Liability @ 1.75%	Hypothetical Termination Liability[1,2] @ 3.00%	Funded Status	Unfunded Termination Liability @ 3.00%
$86,950,874	$239,159,323	36.4%	$152,208,449	$207,359,541	41.9%	$120,408,667

[1] The hypothetical liabilities calculated above include a 7 percent mortality contingency load in accordance with Board policy. Other actuarial assumptions can be found in Appendix A.

[2] The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date. The discount rates used in the table are based on 20-year Treasury bonds, rounded to the nearest quarter percentage point, which is a good proxy for most plans. The 20-year Treasury yield was 1.75 percent on June 30, 2016, and was 2.75 percent on January 31, 2017.

In order to terminate the plan, you must first contact our Retirement Services Contract Unit to initiate a Resolution of Intent to Terminate. The completed Resolution will allow the plan actuary to give you a preliminary termination valuation with a more up-to-date estimate of the plan liabilities. CalPERS advises you to consult with the plan actuary before beginning this process.

PLAN’S MAJOR BENEFIT PROVISIONS

Plan's Major Benefit Options

Shown below is a summary of the major optional benefits for which your agency has contracted for this plan. A description of principal standard and optional plan provisions is in Appendix B of this report.

	Contract Package					
Benefit Provision	Active Misc	Active Misc	Inactive Misc	Inactive Misc	Receiving Misc	
Benefit Formula	2.5% @ 55	2.0% @ 62	2.0% @ 55	2.0% @ 55		
Social Security Coverage	No	No	No	Yes		
Full/Modified	Full	Full	Full	Modified		
Employee Contribution Rate	8.00%	6.25%				
Final Average Compensation Period	One Year	Three Year	One Year	One Year		
Sick Leave Credit	Yes	Yes	Yes	Yes		
Non-Industrial Disability	Standard	Standard	Standard	Standard		
Industrial Disability	No	No	No	No		
Pre-Retirement Death Benefits						
Optional Settlement 2W	No	No	No	No		
1959 Survivor Benefit Level	Level 4	Level 4	Level 4	No		
Special	No	No	No	No		
Alternate (firefighters)	No	No	No	No		
Post-Retirement Death Benefits						
Lump Sum	$500	$500	$500	$500	$500	
Survivor Allowance (PRSA)	No	No	No	No	No	
COLA	2%	2%	2%	2%	2%	

APPENDICES

- **APPENDIX A – ACTUARIAL METHODS AND ASSUMPTIONS**
- **APPENDIX B – PRINCIPAL PLAN PROVISIONS**
- **APPENDIX C – PARTICIPANT DATA**
- **APPENDIX D – DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES**
- **APPENDIX E – GLOSSARY OF ACTUARIAL TERMS**

APPENDIX A

ACTUARIAL METHODS AND ASSUMPTIONS

- **ACTUARIAL DATA**
- **ACTUARIAL METHODS**
- **ACTUARIAL ASSUMPTIONS**
- **MISCELLANEOUS**

Actuarial Data

As stated in the Actuarial Certification, the data which serves as the basis of this valuation has been obtained from the various CalPERS databases. We have reviewed the valuation data and believe that it is reasonable and appropriate in aggregate. We are unaware of any potential data issues that would have a material effect on the results of this valuation, except that data does not always contain the latest salary information for former members now in reciprocal systems and does not recognize the potential for unusually large salary deviation in certain cases such as elected officials. Therefore, salary information in these cases may not be accurate. These situations are relatively infrequent, however, and when they do occur, they generally do not have a material impact on the required employer contributions.

Actuarial Methods

Actuarial Cost Method

The actuarial cost method used is the Entry Age Normal Cost Method. Under this method, projected benefits are determined for all members and the associated liabilities are spread in a manner that produces level annual cost as a percentage of pay in each year from the member's entry age to their assumed retirement age on the valuation date. The cost allocated to the current fiscal year is called the normal cost.

The actuarial accrued liability for active members is then calculated as the portion of the total cost of the plan allocated to prior years. The actuarial accrued liability for members currently receiving benefits and for members entitled to deferred benefits is equal to the present value of the benefits expected to be paid. No normal costs are applicable for these participants.

Amortization of Unfunded Actuarial Accrued Liability

The excess of the total actuarial accrued liability over the market value of plan assets is called the unfunded actuarial accrued liability (UAL). Funding requirements are determined by adding the normal cost and an amortization payment toward the unfunded liability. The unfunded liability is amortized as a "level percent of pay". Commencing with the June 30, 2013 valuation, all new gains or losses are amortized over a fixed 30-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. All changes in liability due to plan amendments (other than golden handshakes) are amortized over a 20-year period with no ramp. Changes in actuarial assumptions or changes in actuarial methodology are amortized over a 20-year period with a 5-year ramp up at the beginning and a 5-year ramp down at the end of the amortization period. Changes in unfunded accrued liability due to a Golden Handshake will be amortized over a period of five years.

The 5-year ramp up means that the payments in the first four years of the amortization period are 20 percent, 40 percent, 60 percent and 80 percent of the "full" payment which begins in year five. The 5-year ramp down means that the reverse is true in the final four years of the amortization period.

<u>Exceptions for Inconsistencies:</u>

An exception to the amortization rules above is used whenever their application results in inconsistencies. In these cases, a "fresh start" approach is used. This means that the current unfunded actuarial liability is projected and amortized over a set number of years. For example, a fresh start is needed in the following situations:

1) When a positive payment would be required on a negative unfunded actuarial liability (or conversely a negative payment on a positive unfunded actuarial liability); or
2) When there are excess assets, rather than an unfunded liability. In this situation, a 30-year fresh start is used.

It should be noted that the actuary may determine that a fresh start is necessary under other circumstances. In all cases of a fresh start, the period is set by the actuary at what is deemed appropriate; however, the period will not be greater than 30 years.

Exceptions for Inactive Plans:

The following exceptions apply to plans classified as Inactive. These plans have no active members and no expectation to have active members in the future.

- Amortization of the unfunded liability is on a "level dollar" basis rather than a "level percent of pay" basis. For amortization layers which utilize a ramp up and ramp down, the "ultimate" payment is constant.
- Actuarial judgment will be used to shorten amortization periods for Inactive plans with existing periods that are deemed too long given the duration of the liability. The specific demographics of the plan will be used to determine if shorter periods may be more appropriate.

Asset Valuation Method

It is the policy of the CalPERS Board of Administration to use professionally accepted amortization methods to eliminate a surplus or an unfunded accrued liability in a manner that maintains benefit security for the members of the System while minimizing substantial variations in required employer contributions. On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and rate smoothing policies. Beginning with the June 30, 2013 valuations that set the employer contribution for Fiscal Year 2015-16, CalPERS employs a policy that amortizes all gains and losses over a fixed 30-year period. The increase or decrease in the rate is then spread directly over a 5-year period. This method is referred to as "direct rate smoothing." CalPERS no longer uses an actuarial value of assets and only uses the market value of assets. The direct rate smoothing method is equivalent to a method using a 5 year asset smoothing period with no actuarial value of asset corridor and a 25-year amortization period for gains and losses.

PEPRA Normal Cost Rate Methodology

Per Government Code Section 7522.30(b) the "normal cost rate" shall mean the annual actuarially determined normal cost for the plan of retirement benefits provided to the new member and shall be established based on actuarial assumptions used to determine the liabilities and costs as part of the annual actuarial valuation. The plan of retirement benefits shall include any elements that would impact the actuarial determination of the normal cost, including, but not limited to, the retirement formula, eligibility and vesting criteria, ancillary benefit provisions, and any automatic cost-of-living adjustments as determined by the public retirement system.

Each non-pooled plan is considered to be stable with a sufficiently large demographic of actives. It is preferable to determine normal cost using a large active population ongoing so that this rate remains relatively stable. The total PEPRA normal cost will be calculated using all active members within a non-pooled plan until the number of members covered under the PEPRA formula meets either:

1. 50 percent of the active population, or
2. 25 percent of the active population and 100 or more PEPRA members

Once either of the conditions above are met for a non-pooled plan, the total PEPRA normal cost will be based on the active PEPRA population in the plan.

Accordingly, the total normal cost will be funded equally between employer and employee based on the demographics of the employees of that employer.

Actuarial Assumptions

In 2014, CalPERS completed a 2-year asset liability management study incorporating actuarial assumptions and strategic asset allocation. On February 19, 2014, the CalPERS Board of Administration adopted relatively modest changes to the asset allocation that reduced the expected volatility of returns. The adopted asset allocation was expected to have a long-term blended return that continued to support a discount rate assumption of 7.5 percent at that time. The Board also approved several changes to the demographic assumptions that more closely aligned with actual experience. The most significant of these is mortality improvement to acknowledge the greater life expectancies we are seeing in our membership and expected continued improvements. These new actuarial assumptions were first used in the June 30, 2014 valuation to set the Fiscal Year 2016-17 contribution for public agency employers.

On December 21, 2016, the CalPERS Board of Administration lowered the discount rate from 7.50 percent to 7.00 percent using a three year phase-in beginning with the June 30, 2016 actuarial valuations. The minimum employer contributions for Fiscal Year 2018-19 determined in this valuation were calculated using a discount rate of 7.375 percent. The projected employer contributions on Page 5 are calculated assuming that the discount rate will be lowered to 7.25 percent next year and 7.00 percent the following year as adopted by the Board. The decision to reduce the discount rate was primarily based on reduced capital market assumptions provided by external investment consultants and CalPERS investment staff. The specific decision adopted by the Board reflected recommendations from CalPERS staff and additional input from employer and employee stakeholder groups. Based on the investment allocation adopted by the Board and capital market assumptions, the reduced discount rate schedule provides a more realistic assumption for the long term investment return of the fund.

Notwithstanding the Board's decision to phase into a 7.0 percent discount rate, subsequent analysis of the expected investment return of CalPERS assets or changes to the investment allocation may result in a change to this three year discount rate schedule. A comprehensive analysis of all actuarial assumptions and methods including the discount rate will be conducted in 2017.

For more details and additional rationale for the selection of the actuarial assumptions, please refer to the CalPERS Experience Study and Review of Actuarial Assumptions report from January 2014 that can be found on the CalPERS website under: "Forms and Publications". Click on "View All" and search for Experience Study.

All actuarial assumptions (except the discount rates used for the hypothetical termination liability) represent an estimate of future experience rather than observations of the estimates inherent in market data.

Economic Assumptions

Discount Rate

The prescribed discount rate assumption adopted by the Board on December 21, 2016 is 7.375 percent compounded annually (net of investment and administrative expenses) as of 6/30/2016.

The Board also prescribed that the assumed discount rate will reduce to 7.25 percent compounded annually (net of expenses) as of 6/30/2017, and 7.0 percent compounded annually (net of expenses) as of 6/30/2018. These further changes to the discount rate assumption are not reflected in the determination of required contributions determined in this report for Fiscal Year 2018-19.

Termination Liability Discount Rate

The current discount rate assumption used for termination valuations is a weighted average of the 10-year and 30-year U.S. Treasury yields where the weights are based on matching asset and liability durations as of the termination date.

The hypothetical termination liabilities in this report are calculated using an observed range of market interest rates. This range is based on the lowest and highest 20-year Treasury bond observed during an approximate 2-year period centered around the valuation date. The 20-year Treasury bond has a similar duration to most plan liabilities and serves as a good proxy for the termination discount rate. The 20-year Treasury yield was 1.75 percent on June 30, 2016.

Salary Growth

Annual increases vary by category, entry age, and duration of service. A sample of assumed increases are shown below.

Public Agency Miscellaneous

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1220	0.1160	0.1020
1	0.0990	0.0940	0.0830
2	0.0860	0.0810	0.0710
3	0.0770	0.0720	0.0630
4	0.0700	0.0650	0.0570
5	0.0640	0.0600	0.0520
10	0.0460	0.0430	0.0390
15	0.0420	0.0400	0.0360
20	0.0390	0.0380	0.0340
25	0.0370	0.0360	0.0330
30	0.0350	0.0340	0.0320

Public Agency Fire

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.2000	0.1980	0.1680
1	0.1490	0.1460	0.1250
2	0.1200	0.1160	0.0990
3	0.0980	0.0940	0.0810
4	0.0820	0.0780	0.0670
5	0.0690	0.0640	0.0550
10	0.0470	0.0460	0.0420
15	0.0440	0.0420	0.0390
20	0.0420	0.0390	0.0360
25	0.0400	0.0370	0.0340
30	0.0380	0.0360	0.0340

Public Agency Police

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1500	0.1470	0.1310
1	0.1160	0.1120	0.1010
2	0.0950	0.0920	0.0830
3	0.0810	0.0780	0.0700
4	0.0700	0.0670	0.0600
5	0.0610	0.0580	0.0520
10	0.0450	0.0430	0.0370
15	0.0450	0.0430	0.0370
20	0.0450	0.0430	0.0370
25	0.0450	0.0430	0.0370
30	0.0450	0.0430	0.0370

Salary Growth (continued)

Public Agency County Peace Officers

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.1770	0.1670	0.1500
1	0.1340	0.1260	0.1140
2	0.1080	0.1030	0.0940
3	0.0900	0.0860	0.0790
4	0.0760	0.0730	0.0670
5	0.0650	0.0620	0.0580
10	0.0470	0.0450	0.0410
15	0.0460	0.0450	0.0390
20	0.0460	0.0450	0.0380
25	0.0460	0.0450	0.0380
30	0.0460	0.0440	0.0380

Schools

Duration of Service	(Entry Age 20)	(Entry Age 30)	(Entry Age 40)
0	0.0900	0.0880	0.0820
1	0.0780	0.0750	0.0700
2	0.0700	0.0680	0.0630
3	0.0650	0.0630	0.0580
4	0.0610	0.0590	0.0540
5	0.0580	0.0560	0.0510
10	0.0460	0.0450	0.0410
15	0.0420	0.0410	0.0380
20	0.0390	0.0380	0.0350
25	0.0370	0.0350	0.0330
30	0.0350	0.0330	0.0310

- The Miscellaneous salary scale is used for Local Prosecutors.
- The Police salary scale is used for Other Safety, Local Sheriff, and School Police.

Overall Payroll Growth

3.00 percent compounded annually (used in projecting the payroll over which the unfunded liability is amortized). This assumption is used for all plans with active members.

Inflation

2.75 percent compounded annually.

Non-valued Potential Additional Liabilities

The potential liability loss for a cost-of-living increase exceeding the 2.75 percent inflation assumption, and any potential liability loss from future member service purchases are not reflected in the valuation.

Miscellaneous Loading Factors

Credit for Unused Sick Leave

Total years of service is increased by 1 percent for those plans that have accepted the provision providing Credit for Unused Sick Leave.

Conversion of Employer Paid Member Contributions (EPMC)

Total years of service is increased by the Employee Contribution Rate for those plans with the provision providing for the Conversion of Employer Paid Member Contributions (EPMC) during the final compensation period.

Norris Decision (Best Factors)

Employees hired prior to July 1, 1982 have projected benefit amounts increased in order to reflect the use of "Best Factors" in the calculation of optional benefit forms. This is due to a 1983 Supreme Court decision, known as the Norris decision, which required males and females to be treated equally in the determination of benefit amounts. Consequently, anyone already employed at that time is given the best possible conversion factor when optional benefits are determined. No loading is necessary for employees hired after July 1, 1982.

Termination Liability

The termination liabilities include a 7 percent contingency load. This load is for unforeseen improvements in mortality.

Demographic Assumptions

Pre-Retirement Mortality

Non-industrial death rates vary by age and gender. Industrial death rates vary by age. See sample rates in table below. The non-industrial death rates are used for all plans. The industrial death rates are used for safety plans (except for Local Prosecutor safety members where the corresponding miscellaneous plan does not have the Industrial Death Benefit).

	Non-Industrial Death (Not Job-Related)		**Industrial Death (Job-Related)**
Age	Male	Female	Male and Female
20	0.00031	0.00020	0.00003
25	0.00040	0.00023	0.00007
30	0.00049	0.00025	0.00010
35	0.00057	0.00035	0.00012
40	0.00075	0.00050	0.00013
45	0.00106	0.00071	0.00014
50	0.00155	0.00100	0.00015
55	0.00228	0.00138	0.00016
60	0.00308	0.00182	0.00017
65	0.00400	0.00257	0.00018
70	0.00524	0.00367	0.00019
75	0.00713	0.00526	0.00020
80	0.00990	0.00814	0.00021

Miscellaneous plans usually have industrial death rates set to zero unless the agency has specifically contracted for industrial death benefits. If so, each non-industrial death rate shown above will be split into two components; 99 percent will become the non-industrial death rate and 1 percent will become the industrial death rate.

Post-Retirement Mortality

Rates vary by age, type of retirement, and gender. See sample rates in table below. These rates are used for all plans.

	Healthy Recipients		Non-Industrially Disabled (Not Job-Related)		Industrially Disabled (Job-Related)	
Age	Male	Female	Male	Female	Male	Female
50	0.00501	0.00466	0.01680	0.01158	0.00501	0.00466
55	0.00599	0.00416	0.01973	0.01149	0.00599	0.00416
60	0.00710	0.00436	0.02289	0.01235	0.00754	0.00518
65	0.00829	0.00588	0.02451	0.01607	0.01122	0.00838
70	0.01305	0.00993	0.02875	0.02211	0.01635	0.01395
75	0.02205	0.01722	0.03990	0.03037	0.02834	0.02319
80	0.03899	0.02902	0.06083	0.04725	0.04899	0.03910
85	0.06969	0.05243	0.09731	0.07762	0.07679	0.06251
90	0.12974	0.09887	0.14804	0.12890	0.12974	0.09887
95	0.22444	0.18489	0.22444	0.21746	0.22444	0.18489
100	0.32536	0.30017	0.32536	0.30017	0.32536	0.30017
105	0.58527	0.56093	0.58527	0.56093	0.58527	0.56093
110	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

The post-retirement mortality rates above include 20 years of projected on-going mortality improvement using Scale BB published by the Society of Actuaries.

Marital Status

For active members, a percentage who are married upon retirement is assumed according to member category as shown in the following table.

Member Category	Percent Married
Miscellaneous Member	85%
Local Police	90%
Local Fire	90%
Other Local Safety	90%
School Police	90%

Age of Spouse

It is assumed that female spouses are 3 years younger than male spouses. This assumption is used for all plans.

Terminated Members

It is assumed that terminated members refund immediately if non-vested. Terminated members who are vested are assumed to follow the same service retirement pattern as active members but with a load to reflect the expected higher rates of retirement, especially at lower ages. The following table shows the load factors that are applied to the service retirement assumption for active members to obtain the service retirement pattern for separated vested members:

Age	Load Factor Miscellaneous	Load Factor Safety
50	190%	310%
51	110%	190%
52	110%	105%
53 through 54	100%	105%
55	100%	140%
56 and above	100% (no change)	100% (no change)

Termination with Refund

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1742	0.1674	0.1606	0.1537	0.1468	0.1400
1	0.1545	0.1477	0.1409	0.1339	0.1271	0.1203
2	0.1348	0.1280	0.1212	0.1142	0.1074	0.1006
3	0.1151	0.1083	0.1015	0.0945	0.0877	0.0809
4	0.0954	0.0886	0.0818	0.0748	0.0680	0.0612
5	0.0212	0.0193	0.0174	0.0155	0.0136	0.0116
10	0.0138	0.0121	0.0104	0.0088	0.0071	0.0055
15	0.0060	0.0051	0.0042	0.0032	0.0023	0.0014
20	0.0037	0.0029	0.0021	0.0013	0.0005	0.0001
25	0.0017	0.0011	0.0005	0.0001	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
0	0.0710	0.1013	0.0997
1	0.0554	0.0636	0.0782
2	0.0398	0.0271	0.0566
3	0.0242	0.0258	0.0437
4	0.0218	0.0245	0.0414
5	0.0029	0.0086	0.0145
10	0.0009	0.0053	0.0089
15	0.0006	0.0027	0.0045
20	0.0005	0.0017	0.0020
25	0.0003	0.0012	0.0009
30	0.0003	0.0009	0.0006
35	0.0003	0.0009	0.0006

The police termination and refund rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40	Entry Age 45
0	0.1730	0.1627	0.1525	0.1422	0.1319	0.1217
1	0.1585	0.1482	0.1379	0.1277	0.1174	0.1071
2	0.1440	0.1336	0.1234	0.1131	0.1028	0.0926
3	0.1295	0.1192	0.1089	0.0987	0.0884	0.0781
4	0.1149	0.1046	0.0944	0.0841	0.0738	0.0636
5	0.0278	0.0249	0.0221	0.0192	0.0164	0.0135
10	0.0172	0.0147	0.0122	0.0098	0.0074	0.0049
15	0.0115	0.0094	0.0074	0.0053	0.0032	0.0011
20	0.0073	0.0055	0.0038	0.0020	0.0002	0.0002
25	0.0037	0.0023	0.0010	0.0002	0.0002	0.0002
30	0.0015	0.0003	0.0002	0.0002	0.0002	0.0002
35	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002

Termination with Vested Benefits

Rates vary by entry age and service for miscellaneous plans. Rates vary by service for safety plans. See sample rates in tables below.

Public Agency Miscellaneous

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0656	0.0597	0.0537	0.0477	0.0418
10	0.0530	0.0466	0.0403	0.0339	0.0000
15	0.0443	0.0373	0.0305	0.0000	0.0000
20	0.0333	0.0261	0.0000	0.0000	0.0000
25	0.0212	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Public Agency Safety

Duration of Service	Fire	Police	County Peace Officer
5	0.0162	0.0163	0.0265
10	0.0061	0.0126	0.0204
15	0.0058	0.0082	0.0130
20	0.0053	0.0065	0.0074
25	0.0047	0.0058	0.0043
30	0.0045	0.0056	0.0030
35	0.0000	0.0000	0.0000

- When a member is eligible to retire, the termination with vested benefits probability is set to zero.
- After termination with vested benefits, a miscellaneous member is assumed to retire at age 59 and a safety member at age 54.
- The Police termination with vested benefits rates are also used for Public Agency Local Prosecutors, Other Safety, Local Sheriff, and School Police.

Schools

Duration of Service	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35	Entry Age 40
5	0.0816	0.0733	0.0649	0.0566	0.0482
10	0.0629	0.0540	0.0450	0.0359	0.0000
15	0.0537	0.0440	0.0344	0.0000	0.0000
20	0.0420	0.0317	0.0000	0.0000	0.0000
25	0.0291	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Non-Industrial (Not Job-Related) Disability

Rates vary by age and gender for miscellaneous plans. Rates vary by age and category for safety plans.

	Miscellaneous		Fire	Police	County Peace Officer	Schools	
Age	Male	Female	Male and Female	Male and Female	Male and Female	Male	Female
20	0.0002	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003
25	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
35	0.0005	0.0008	0.0001	0.0003	0.0004	0.0005	0.0004
40	0.0012	0.0016	0.0001	0.0004	0.0007	0.0015	0.0010
45	0.0019	0.0022	0.0002	0.0005	0.0013	0.0030	0.0019
50	0.0021	0.0023	0.0005	0.0008	0.0018	0.0039	0.0024
55	0.0022	0.0018	0.0010	0.0013	0.0010	0.0036	0.0021
60	0.0022	0.0014	0.0015	0.0020	0.0006	0.0031	0.0014

- The miscellaneous non-industrial disability rates are used for Local Prosecutors.
- The police non-industrial disability rates are also used for Other Safety, Local Sheriff, and School Police.

Industrial (Job-Related) Disability

Rates vary by age and category.

Age	Fire	Police	County Peace Officer
20	0.0001	0.0000	0.0004
25	0.0003	0.0017	0.0013
30	0.0007	0.0048	0.0025
35	0.0016	0.0079	0.0037
40	0.0030	0.0110	0.0051
45	0.0053	0.0141	0.0067
50	0.0277	0.0185	0.0092
55	0.0409	0.0479	0.0151
60	0.0583	0.0602	0.0174

- The police industrial disability rates are also used for Local Sheriff and Other Safety.
- Fifty percent of the police industrial disability rates are used for School Police.
- One percent of the police industrial disability rates are used for Local Prosecutors.
- Normally, rates are zero for miscellaneous plans unless the agency has specifically contracted for industrial disability benefits. If so, each miscellaneous non-industrial disability rate will be split into two components: 50 percent will become the non-industrial disability rate and 50 percent will become the industrial disability rate.

Service Retirement

Retirement rates vary by age, service, and formula, except for the safety ½ @ 55 and 2% @ 55 formulas, where retirement rates vary by age only.

Service Retirement

Public Agency Miscellaneous 1.5% @ 65

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.008	0.011	0.013	0.015	0.017	0.019
51	0.007	0.010	0.012	0.013	0.015	0.017
52	0.010	0.014	0.017	0.019	0.021	0.024
53	0.008	0.012	0.015	0.017	0.019	0.022
54	0.012	0.016	0.019	0.022	0.025	0.028
55	0.018	0.025	0.031	0.035	0.038	0.043
56	0.015	0.021	0.025	0.029	0.032	0.036
57	0.020	0.028	0.033	0.038	0.043	0.048
58	0.024	0.033	0.040	0.046	0.052	0.058
59	0.028	0.039	0.048	0.054	0.060	0.067
60	0.049	0.069	0.083	0.094	0.105	0.118
61	0.062	0.087	0.106	0.120	0.133	0.150
62	0.104	0.146	0.177	0.200	0.223	0.251
63	0.099	0.139	0.169	0.191	0.213	0.239
64	0.097	0.136	0.165	0.186	0.209	0.233
65	0.140	0.197	0.240	0.271	0.302	0.339
66	0.092	0.130	0.157	0.177	0.198	0.222
67	0.129	0.181	0.220	0.249	0.277	0.311
68	0.092	0.129	0.156	0.177	0.197	0.221
69	0.092	0.130	0.158	0.178	0.199	0.224
70	0.103	0.144	0.175	0.198	0.221	0.248

Public Agency Miscellaneous 2% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.010	0.013	0.015	0.018	0.019	0.021
51	0.009	0.011	0.014	0.016	0.017	0.019
52	0.011	0.014	0.017	0.020	0.022	0.024
53	0.010	0.012	0.015	0.017	0.020	0.021
54	0.015	0.019	0.023	0.025	0.029	0.031
55	0.022	0.029	0.035	0.040	0.045	0.049
56	0.018	0.024	0.028	0.033	0.036	0.040
57	0.024	0.032	0.038	0.043	0.049	0.053
58	0.027	0.036	0.043	0.049	0.055	0.061
59	0.033	0.044	0.054	0.061	0.068	0.076
60	0.056	0.077	0.092	0.105	0.117	0.130
61	0.071	0.097	0.118	0.134	0.149	0.166
62	0.117	0.164	0.198	0.224	0.250	0.280
63	0.122	0.171	0.207	0.234	0.261	0.292
64	0.114	0.159	0.193	0.218	0.244	0.271
65	0.150	0.209	0.255	0.287	0.321	0.358
66	0.114	0.158	0.192	0.217	0.243	0.270
67	0.141	0.196	0.238	0.270	0.301	0.337
68	0.103	0.143	0.174	0.196	0.219	0.245
69	0.109	0.153	0.185	0.209	0.234	0.261
70	0.117	0.162	0.197	0.222	0.248	0.277

Service Retirement

Public Agency Miscellaneous 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.018	0.021	0.025	0.027	0.031
51	0.012	0.014	0.017	0.020	0.021	0.025
52	0.013	0.017	0.019	0.023	0.025	0.028
53	0.015	0.020	0.023	0.027	0.030	0.034
54	0.026	0.033	0.038	0.045	0.051	0.059
55	0.048	0.061	0.074	0.088	0.100	0.117
56	0.042	0.053	0.063	0.075	0.085	0.100
57	0.044	0.056	0.067	0.081	0.091	0.107
58	0.049	0.062	0.074	0.089	0.100	0.118
59	0.057	0.072	0.086	0.103	0.118	0.138
60	0.067	0.086	0.103	0.123	0.139	0.164
61	0.081	0.103	0.124	0.148	0.168	0.199
62	0.116	0.147	0.178	0.214	0.243	0.288
63	0.114	0.144	0.174	0.208	0.237	0.281
64	0.108	0.138	0.166	0.199	0.227	0.268
65	0.155	0.197	0.238	0.285	0.325	0.386
66	0.132	0.168	0.203	0.243	0.276	0.328
67	0.122	0.155	0.189	0.225	0.256	0.304
68	0.111	0.141	0.170	0.204	0.232	0.274
69	0.114	0.144	0.174	0.209	0.238	0.282
70	0.130	0.165	0.200	0.240	0.272	0.323

Public Agency Miscellaneous 2.5% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.019	0.029	0.049	0.094
51	0.004	0.009	0.019	0.029	0.049	0.094
52	0.004	0.009	0.020	0.030	0.050	0.095
53	0.008	0.014	0.025	0.036	0.058	0.104
54	0.024	0.034	0.050	0.066	0.091	0.142
55	0.066	0.088	0.115	0.142	0.179	0.241
56	0.042	0.057	0.078	0.098	0.128	0.184
57	0.041	0.057	0.077	0.097	0.128	0.183
58	0.045	0.061	0.083	0.104	0.136	0.192
59	0.055	0.074	0.098	0.123	0.157	0.216
60	0.066	0.088	0.115	0.142	0.179	0.241
61	0.072	0.095	0.124	0.153	0.191	0.255
62	0.099	0.130	0.166	0.202	0.248	0.319
63	0.092	0.121	0.155	0.189	0.233	0.302
64	0.091	0.119	0.153	0.187	0.231	0.299
65	0.122	0.160	0.202	0.245	0.297	0.374
66	0.138	0.179	0.226	0.272	0.329	0.411
67	0.114	0.149	0.189	0.229	0.279	0.354
68	0.100	0.131	0.168	0.204	0.250	0.322
69	0.114	0.149	0.189	0.229	0.279	0.354
70	0.127	0.165	0.209	0.253	0.306	0.385

Service Retirement

Public Agency Miscellaneous 2.7% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.009	0.014	0.035	0.055	0.095
51	0.002	0.006	0.011	0.030	0.050	0.090
52	0.006	0.012	0.017	0.038	0.059	0.099
53	0.010	0.017	0.024	0.046	0.068	0.110
54	0.032	0.044	0.057	0.085	0.113	0.160
55	0.076	0.101	0.125	0.165	0.205	0.265
56	0.055	0.074	0.093	0.127	0.160	0.214
57	0.050	0.068	0.086	0.118	0.151	0.204
58	0.055	0.074	0.093	0.127	0.161	0.215
59	0.061	0.082	0.102	0.138	0.174	0.229
60	0.069	0.093	0.116	0.154	0.192	0.250
61	0.086	0.113	0.141	0.183	0.225	0.288
62	0.105	0.138	0.171	0.218	0.266	0.334
63	0.103	0.135	0.167	0.215	0.262	0.329
64	0.109	0.143	0.177	0.226	0.275	0.344
65	0.134	0.174	0.215	0.270	0.326	0.401
66	0.147	0.191	0.235	0.294	0.354	0.433
67	0.121	0.158	0.196	0.248	0.300	0.372
68	0.113	0.147	0.182	0.232	0.282	0.352
69	0.117	0.153	0.189	0.240	0.291	0.362
70	0.141	0.183	0.226	0.283	0.341	0.418

Public Agency Miscellaneous 3% @ 60

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.012	0.018	0.024	0.039	0.040	0.091
51	0.009	0.014	0.019	0.034	0.034	0.084
52	0.014	0.020	0.026	0.043	0.044	0.096
53	0.016	0.023	0.031	0.048	0.050	0.102
54	0.026	0.036	0.045	0.065	0.070	0.125
55	0.043	0.057	0.072	0.096	0.105	0.165
56	0.042	0.056	0.070	0.094	0.103	0.162
57	0.049	0.065	0.082	0.108	0.119	0.180
58	0.057	0.076	0.094	0.122	0.136	0.199
59	0.076	0.100	0.123	0.157	0.175	0.244
60	0.114	0.148	0.182	0.226	0.255	0.334
61	0.095	0.123	0.152	0.190	0.214	0.288
62	0.133	0.172	0.211	0.260	0.294	0.378
63	0.129	0.166	0.204	0.252	0.285	0.368
64	0.143	0.185	0.226	0.278	0.315	0.401
65	0.202	0.260	0.318	0.386	0.439	0.542
66	0.177	0.228	0.279	0.340	0.386	0.482
67	0.151	0.194	0.238	0.292	0.331	0.420
68	0.139	0.179	0.220	0.270	0.306	0.391
69	0.190	0.245	0.299	0.364	0.414	0.513
70	0.140	0.182	0.223	0.274	0.310	0.396

Service Retirement

Public Agency Miscellaneous 2% @ 62

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000
52	0.010	0.013	0.016	0.019	0.022	0.024
53	0.013	0.017	0.020	0.024	0.027	0.031
54	0.021	0.027	0.033	0.039	0.045	0.050
55	0.044	0.056	0.068	0.080	0.092	0.104
56	0.030	0.039	0.047	0.055	0.063	0.072
57	0.036	0.046	0.056	0.066	0.076	0.086
58	0.046	0.059	0.072	0.085	0.097	0.110
59	0.058	0.074	0.089	0.105	0.121	0.137
60	0.062	0.078	0.095	0.112	0.129	0.146
61	0.062	0.079	0.096	0.113	0.129	0.146
62	0.097	0.123	0.150	0.176	0.202	0.229
63	0.089	0.113	0.137	0.162	0.186	0.210
64	0.094	0.120	0.145	0.171	0.197	0.222
65	0.129	0.164	0.199	0.234	0.269	0.304
66	0.105	0.133	0.162	0.190	0.219	0.247
67	0.105	0.133	0.162	0.190	0.219	0.247
68	0.105	0.133	0.162	0.190	0.219	0.247
69	0.105	0.133	0.162	0.190	0.219	0.247
70	0.125	0.160	0.194	0.228	0.262	0.296

Service Retirement

Public Agency Fire ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0159	56	0.1108
51	0.0000	57	0.0000
52	0.0344	58	0.0950
53	0.0199	59	0.0441
54	0.0413	60	1.00000
55	0.0751		

Public Agency Police ½ @ 55 and 2% @ 55

Age	Rate	Age	Rate
50	0.0255	56	0.0692
51	0.0000	57	0.0511
52	0.0164	58	0.0724
53	0.0272	59	0.0704
54	0.0095	60	1.0000
55	0.1667		

Service Retirement

Public Agency Police 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.017	0.089
51	0.005	0.005	0.005	0.005	0.017	0.087
52	0.018	0.018	0.018	0.018	0.042	0.132
53	0.044	0.044	0.044	0.044	0.090	0.217
54	0.065	0.065	0.065	0.065	0.126	0.283
55	0.086	0.086	0.086	0.086	0.166	0.354
56	0.067	0.067	0.067	0.067	0.130	0.289
57	0.066	0.066	0.066	0.066	0.129	0.288
58	0.066	0.066	0.066	0.066	0.129	0.288
59	0.139	0.139	0.139	0.139	0.176	0.312
60	0.123	0.123	0.123	0.123	0.153	0.278
61	0.110	0.110	0.110	0.110	0.138	0.256
62	0.130	0.130	0.130	0.130	0.162	0.291
63	0.130	0.130	0.130	0.130	0.162	0.291
64	0.130	0.130	0.130	0.130	0.162	0.291
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.009	0.009	0.009	0.009	0.013	0.020
51	0.013	0.013	0.013	0.013	0.020	0.029
52	0.018	0.018	0.018	0.018	0.028	0.042
53	0.052	0.052	0.052	0.052	0.079	0.119
54	0.067	0.067	0.067	0.067	0.103	0.154
55	0.089	0.089	0.089	0.089	0.136	0.204
56	0.083	0.083	0.083	0.083	0.127	0.190
57	0.082	0.082	0.082	0.082	0.126	0.189
58	0.088	0.088	0.088	0.088	0.136	0.204
59	0.074	0.074	0.074	0.074	0.113	0.170
60	0.100	0.100	0.100	0.100	0.154	0.230
61	0.072	0.072	0.072	0.072	0.110	0.165
62	0.099	0.099	0.099	0.099	0.152	0.228
63	0.114	0.114	0.114	0.114	0.175	0.262
64	0.114	0.114	0.114	0.114	0.175	0.262
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.004	0.004	0.004	0.004	0.015	0.086
51	0.014	0.014	0.014	0.014	0.034	0.114
52	0.026	0.026	0.026	0.026	0.060	0.154
53	0.038	0.038	0.038	0.038	0.083	0.188
54	0.071	0.071	0.071	0.071	0.151	0.292
55	0.061	0.061	0.061	0.061	0.131	0.261
56	0.072	0.072	0.072	0.072	0.153	0.295
57	0.065	0.065	0.065	0.065	0.140	0.273
58	0.066	0.066	0.066	0.066	0.142	0.277
59	0.118	0.118	0.118	0.118	0.247	0.437
60	0.065	0.065	0.065	0.065	0.138	0.272
61	0.084	0.084	0.084	0.084	0.178	0.332
62	0.108	0.108	0.108	0.108	0.226	0.405
63	0.084	0.084	0.084	0.084	0.178	0.332
64	0.084	0.084	0.084	0.084	0.178	0.332
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.001	0.001	0.001	0.006	0.016	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.050	0.050	0.050	0.099	0.240	0.314
51	0.034	0.034	0.034	0.072	0.198	0.260
52	0.033	0.033	0.033	0.071	0.198	0.259
53	0.039	0.039	0.039	0.080	0.212	0.277
54	0.045	0.045	0.045	0.092	0.229	0.300
55	0.052	0.052	0.052	0.105	0.248	0.323
56	0.042	0.042	0.042	0.087	0.221	0.289
57	0.043	0.043	0.043	0.088	0.223	0.292
58	0.054	0.054	0.054	0.109	0.255	0.333
59	0.054	0.054	0.054	0.108	0.253	0.330
60	0.060	0.060	0.060	0.121	0.272	0.355
61	0.048	0.048	0.048	0.098	0.238	0.311
62	0.061	0.061	0.061	0.122	0.274	0.357
63	0.057	0.057	0.057	0.115	0.263	0.343
64	0.069	0.069	0.069	0.137	0.296	0.385
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 3% @ 50

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.020	0.020	0.020	0.040	0.130	0.192
51	0.008	0.008	0.008	0.023	0.107	0.164
52	0.023	0.023	0.023	0.043	0.136	0.198
53	0.023	0.023	0.023	0.043	0.135	0.198
54	0.027	0.027	0.027	0.048	0.143	0.207
55	0.043	0.043	0.043	0.070	0.174	0.244
56	0.053	0.053	0.053	0.085	0.196	0.269
57	0.054	0.054	0.054	0.086	0.197	0.271
58	0.052	0.052	0.052	0.084	0.193	0.268
59	0.075	0.075	0.075	0.116	0.239	0.321
60	0.065	0.065	0.065	0.102	0.219	0.298
61	0.076	0.076	0.076	0.117	0.241	0.324
62	0.068	0.068	0.068	0.106	0.224	0.304
63	0.027	0.027	0.027	0.049	0.143	0.208
64	0.094	0.094	0.094	0.143	0.277	0.366
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.011	0.011	0.011	0.011	0.020	0.036
51	0.009	0.009	0.009	0.009	0.016	0.028
52	0.018	0.018	0.018	0.018	0.034	0.060
53	0.037	0.037	0.037	0.037	0.067	0.119
54	0.049	0.049	0.049	0.049	0.089	0.159
55	0.063	0.063	0.063	0.063	0.115	0.205
56	0.045	0.045	0.045	0.045	0.082	0.146
57	0.064	0.064	0.064	0.064	0.117	0.209
58	0.047	0.047	0.047	0.047	0.086	0.154
59	0.105	0.105	0.105	0.105	0.130	0.191
60	0.105	0.105	0.105	0.105	0.129	0.188
61	0.105	0.105	0.105	0.105	0.129	0.188
62	0.105	0.105	0.105	0.105	0.129	0.188
63	0.105	0.105	0.105	0.105	0.129	0.188
64	0.105	0.105	0.105	0.105	0.129	0.188
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.005	0.005	0.005	0.008	0.012
51	0.006	0.006	0.006	0.006	0.009	0.013
52	0.012	0.012	0.012	0.012	0.019	0.028
53	0.033	0.033	0.033	0.033	0.050	0.075
54	0.045	0.045	0.045	0.045	0.069	0.103
55	0.061	0.061	0.061	0.061	0.094	0.140
56	0.055	0.055	0.055	0.055	0.084	0.126
57	0.081	0.081	0.081	0.081	0.125	0.187
58	0.059	0.059	0.059	0.059	0.091	0.137
59	0.055	0.055	0.055	0.055	0.084	0.126
60	0.085	0.085	0.085	0.085	0.131	0.196
61	0.085	0.085	0.085	0.085	0.131	0.196
62	0.085	0.085	0.085	0.085	0.131	0.196
63	0.085	0.085	0.085	0.085	0.131	0.196
64	0.085	0.085	0.085	0.085	0.131	0.196
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.014	0.014	0.014	0.014	0.025	0.045
51	0.012	0.012	0.012	0.012	0.021	0.038
52	0.025	0.025	0.025	0.025	0.046	0.081
53	0.047	0.047	0.047	0.047	0.086	0.154
54	0.063	0.063	0.063	0.063	0.115	0.205
55	0.076	0.076	0.076	0.076	0.140	0.249
56	0.054	0.054	0.054	0.054	0.099	0.177
57	0.071	0.071	0.071	0.071	0.130	0.232
58	0.057	0.057	0.057	0.057	0.103	0.184
59	0.126	0.126	0.126	0.126	0.156	0.229
60	0.126	0.126	0.126	0.126	0.155	0.226
61	0.126	0.126	0.126	0.126	0.155	0.226
62	0.126	0.126	0.126	0.126	0.155	0.226
63	0.126	0.126	0.126	0.126	0.155	0.226
64	0.126	0.126	0.126	0.126	0.155	0.226
65	1.000	1.000	1.000	1.000	1.000	1.000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.5% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.007	0.007	0.007	0.007	0.010	0.015
51	0.008	0.008	0.008	0.008	0.012	0.018
52	0.016	0.016	0.016	0.016	0.025	0.038
53	0.042	0.042	0.042	0.042	0.064	0.096
54	0.057	0.057	0.057	0.057	0.088	0.132
55	0.074	0.074	0.074	0.074	0.114	0.170
56	0.066	0.066	0.066	0.066	0.102	0.153
57	0.090	0.090	0.090	0.090	0.139	0.208
58	0.071	0.071	0.071	0.071	0.110	0.164
59	0.066	0.066	0.066	0.066	0.101	0.151
60	0.102	0.102	0.102	0.102	0.157	0.235
61	0.102	0.102	0.102	0.102	0.157	0.236
62	0.102	0.102	0.102	0.102	0.157	0.236
63	0.102	0.102	0.102	0.102	0.157	0.236
64	0.102	0.102	0.102	0.102	0.157	0.236
65	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement

Public Agency Police 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0138	0.0138	0.0138	0.0138	0.0253	0.0451
51	0.0123	0.0123	0.0123	0.0123	0.0226	0.0402
52	0.0249	0.0249	0.0249	0.0249	0.0456	0.0812
53	0.0497	0.0497	0.0497	0.0497	0.0909	0.1621
54	0.0662	0.0662	0.0662	0.0662	0.1211	0.2160
55	0.0854	0.0854	0.0854	0.0854	0.1563	0.2785
56	0.0606	0.0606	0.0606	0.0606	0.1108	0.1975
57	0.0711	0.0711	0.0711	0.0711	0.1300	0.2318
58	0.0628	0.0628	0.0628	0.0628	0.1149	0.2049
59	0.1396	0.1396	0.1396	0.1396	0.1735	0.2544
60	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
61	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
62	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
63	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
64	0.1396	0.1396	0.1396	0.1396	0.1719	0.2506
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

- These rates also apply to Local Prosecutors, Local Sheriff, School Police, and Other Safety.

Service Retirement

Public Agency Fire 2.7% @ 57

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.0065	0.0065	0.0065	0.0065	0.0101	0.0151
51	0.0081	0.0081	0.0081	0.0081	0.0125	0.0187
52	0.0164	0.0164	0.0164	0.0164	0.0254	0.0380
53	0.0442	0.0442	0.0442	0.0442	0.0680	0.1018
54	0.0606	0.0606	0.0606	0.0606	0.0934	0.1397
55	0.0825	0.0825	0.0825	0.0825	0.1269	0.1900
56	0.0740	0.0740	0.0740	0.0740	0.1140	0.1706
57	0.0901	0.0901	0.0901	0.0901	0.1387	0.2077
58	0.0790	0.0790	0.0790	0.0790	0.1217	0.1821
59	0.0729	0.0729	0.0729	0.0729	0.1123	0.1681
60	0.1135	0.1135	0.1135	0.1135	0.1747	0.2615
61	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
62	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
63	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
64	0.1136	0.1136	0.1136	0.1136	0.1749	0.2618
65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Service Retirement

Schools 2% @ 55

	Duration of Service					
Age	5 Years	10 Years	15 Years	20 Years	25 Years	30 Years
50	0.005	0.009	0.013	0.015	0.016	0.018
51	0.005	0.010	0.014	0.017	0.019	0.021
52	0.006	0.012	0.017	0.020	0.022	0.025
53	0.007	0.014	0.019	0.023	0.026	0.029
54	0.012	0.024	0.033	0.039	0.044	0.049
55	0.024	0.048	0.067	0.079	0.088	0.099
56	0.020	0.039	0.055	0.065	0.072	0.081
57	0.021	0.042	0.059	0.070	0.078	0.087
58	0.025	0.050	0.070	0.083	0.092	0.103
59	0.029	0.057	0.080	0.095	0.105	0.118
60	0.037	0.073	0.102	0.121	0.134	0.150
61	0.046	0.090	0.126	0.149	0.166	0.186
62	0.076	0.151	0.212	0.250	0.278	0.311
63	0.069	0.136	0.191	0.225	0.251	0.281
64	0.067	0.133	0.185	0.219	0.244	0.273
65	0.091	0.180	0.251	0.297	0.331	0.370
66	0.072	0.143	0.200	0.237	0.264	0.295
67	0.067	0.132	0.185	0.218	0.243	0.272
68	0.060	0.118	0.165	0.195	0.217	0.243
69	0.067	0.133	0.187	0.220	0.246	0.275
70	0.066	0.131	0.183	0.216	0.241	0.270

Miscellaneous

Internal Revenue Code Section 415

The limitations on benefits imposed by Internal Revenue Code Section 415 are taken into account in this valuation. Each year the impact of any changes in this limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. This results in lower contributions for those employers contributing to the Replacement Benefit Fund and protects CalPERS from prefunding expected benefits in excess of limits imposed by federal tax law.

Internal Revenue Code Section 401(a)(17)

The limitations on compensation imposed by Internal Revenue Code Section 401(a)(17) are taken into account in this valuation. Each year, the impact of any changes in the compensation limitation since the prior valuation is included and amortized as part of the actuarial gain or loss base. The compensation limit for classic members for the 2016 calendar year is $265,000.

APPENDIX B

PRINCIPAL PLAN PROVISIONS

The following is a description of the principal plan provisions used in calculating costs and liabilities. We have indicated whether a plan provision is standard or optional. Standard benefits are applicable to all members while optional benefits vary among employers. Optional benefits that apply to a single period of time, such as Golden Handshakes, have not been included. Many of the statements in this summary are general in nature, and are intended to provide an easily understood summary of the Public Employees' Retirement Law. The law itself governs in all situations.

Service Retirement

Eligibility

A classic CalPERS member or PEPRA Safety member becomes eligible for Service Retirement upon attainment of age 50 with at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). For employees hired into a plan with the 1.5 percent at 65 formula, eligibility for service retirement is age 55 with at least 5 years of service. PEPRA miscellaneous members become eligible for service retirement upon attainment of age 52 with at least 5 years of service.

Benefit

The service retirement benefit is a monthly allowance equal to the product of the *benefit factor*, *years of service*, and *final compensation.*

- The *benefit factor* depends on the benefit formula specified in your agency's contract. The table below shows the factors for each of the available formulas. Factors vary by the member's age at retirement. Listed are the factors for retirement at whole year ages:

<u>Miscellaneous Plan Formulas</u>

Retirement Age	1.5% at 65	2% at 60	2% at 55	2.5% at 55	2.7% at 55	3% at 60	PEPRA 2% at 62
50	0.5000%	1.092%	1.426%	2.000%	2.000%	2.000%	N/A
51	0.5667%	1.156%	1.522%	2.100%	2.140%	2.100%	N/A
52	0.6334%	1.224%	1.628%	2.200%	2.280%	2.200%	1.000%
53	0.7000%	1.296%	1.742%	2.300%	2.420%	2.300%	1.100%
54	0.7667%	1.376%	1.866%	2.400%	2.560%	2.400%	1.200%
55	0.8334%	1.460%	2.000%	2.500%	2.700%	2.500%	1.300%
56	0.9000%	1.552%	2.052%	2.500%	2.700%	2.600%	1.400%
57	0.9667%	1.650%	2.104%	2.500%	2.700%	2.700%	1.500%
58	1.0334%	1.758%	2.156%	2.500%	2.700%	2.800%	1.600%
59	1.1000%	1.874%	2.210%	2.500%	2.700%	2.900%	1.700%
60	1.1667%	2.000%	2.262%	2.500%	2.700%	3.000%	1.800%
61	1.2334%	2.134%	2.314%	2.500%	2.700%	3.000%	1.900%
62	1.3000%	2.272%	2.366%	2.500%	2.700%	3.000%	2.000%
63	1.3667%	2.418%	2.418%	2.500%	2.700%	3.000%	2.100%
64	1.4334%	2.418%	2.418%	2.500%	2.700%	3.000%	2.200%
65	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.300%
66	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.400%
67 & up	1.5000%	2.418%	2.418%	2.500%	2.700%	3.000%	2.500%

Safety Plan Formulas

Retirement Age	½ at 55 *	2% at 55	2% at 50	3% at 55	3% at 50
50	1.783%	1.426%	2.000%	2.400%	3.000%
51	1.903%	1.522%	2.140%	2.520%	3.000%
52	2.035%	1.628%	2.280%	2.640%	3.000%
53	2.178%	1.742%	2.420%	2.760%	3.000%
54	2.333%	1.866%	2.560%	2.880%	3.000%
55 & Up	2.500%	2.000%	2.700%	3.000%	3.000%

* For this formula, the benefit factor also varies by entry age. The factors shown are for members with an entry age of 35 or greater. If entry age is less than 35, then the age 55 benefit factor is 50 percent divided by the difference between age 55 and entry age. The benefit factor for ages prior to age 55 is the same proportion of the age 55 benefit factor as in the above table.

PEPRA Safety Plan Formulas

Retirement Age	2% at 57	2.5% at 57	2.7% at 57
50	1.426%	2.000%	2.000%
51	1.508%	2.071%	2.100%
52	1.590%	2.143%	2.200%
53	1.672%	2.214%	2.300%
54	1.754%	2.286%	2.400%
55	1.836%	2.357%	2.500%
56	1.918%	2.429%	2.600%
57 & Up	2.000%	2.500%	2.700%

- The *years of service* is the amount credited by CalPERS to a member while he or she is employed in this group (or for other periods that are recognized under the employer's contract with CalPERS). For a member who has earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance. An agency may contract for an optional benefit where any unused sick leave accumulated at the time of retirement will be converted to credited service at a rate of 0.004 years of service for each day of sick leave.

- The *final compensation* is the monthly average of the member's highest 36 or 12 consecutive months' full-time equivalent monthly pay (no matter which CalPERS employer paid this compensation). The standard benefit is 36 months. Employers had the option of providing a final compensation equal to the highest 12 consecutive months for classic plans only. Final compensation must be defined by the highest 36 consecutive months' pay under the 1.5% at 65 formula. PEPRA members have a cap on the annual salary that can be used to calculate final compensation for all new members based on the Social Security contribution and benefit base. For employees that participate in Social Security this cap is $118,775 for 2016 and for those employees that do not participate in Social Security the cap for 2016 is $142,530. Adjustments to the caps are permitted annually based on changes to the CPI for all urban consumers.

- Employees must be covered by Social Security with the 1.5% at 65 formula. Social Security is optional for all other benefit formulas. For employees covered by Social Security, the modified formula is the standard benefit. Under this type of formula, the final compensation is offset by $133.33 (or by one third if the final compensation is less than $400). Employers may contract for the full benefit with Social Security that will eliminate the offset applicable to the final compensation. For employees not covered by Social Security, the full benefit is paid with no offsets. Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 if members are not covered by Social Security or $513 if members are covered by Social Security.

- The miscellaneous and PEPRA safety service retirement benefit is not capped. The classic Safety service retirement benefit is capped at 90 percent of final compensation.

Vested Deferred Retirement

Eligibility for Deferred Status

A CalPERS member becomes eligible for a deferred vested retirement benefit when he or she leaves employment, keeps his or her contribution account balance on deposit with CalPERS, **and** has earned at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements).

Eligibility to Start Receiving Benefits

The CalPERS classic members and PEPRA safety members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 50 (55 for employees hired into a 1.5% @ 65 plan). PEPRA miscellaneous members become eligible to receive the deferred retirement benefit upon satisfying the eligibility requirements for deferred status and upon attainment of age 52.

Benefit

The vested deferred retirement benefit is the same as the service retirement benefit, where the benefit factor is based on the member's age at allowance commencement. For members who have earned service with multiple CalPERS employers, the benefit from each employer is calculated separately according to each employer's contract, and then added together for the total allowance.

Non-Industrial (Non-Job Related) Disability Retirement

Eligibility

A CalPERS member is eligible for Non-Industrial Disability Retirement if he or she becomes *disabled* and has at least 5 years of credited service (total service across all CalPERS employers, and with certain other retirement systems with which CalPERS has reciprocity agreements). There is no special age requirement. *Disabled* means the member is unable to perform his or her job because of an illness or injury, which is expected to be permanent or to last indefinitely. The illness or injury does not have to be job related. A CalPERS member must be actively employed by any CalPERS employer at the time of disability in order to be eligible for this benefit.

Standard Benefit

The standard Non-Industrial Disability Retirement benefit is a monthly allowance equal to 1.8 percent of final compensation, multiplied by *service*, which is determined as follows:

- *Service* is CalPERS credited service, for members with less than 10 years of service or greater than 18.518 years of service; or

- *Service* is CalPERS credited service plus the additional number of years that the member would have worked until age 60, for members with at least 10 years but not more than 18.518 years of service. The maximum benefit in this case is 33 1/3 percent of final compensation.

Improved Benefit

Employers have the option of providing the improved Non-Industrial Disability Retirement benefit. This benefit provides a monthly allowance equal to 30 percent of final compensation for the first 5 years of service, plus 1 percent for each additional year of service to a maximum of 50 percent of final compensation.

Members who are eligible for a larger service retirement benefit may choose to receive that benefit in lieu of a disability benefit. Members eligible to retire, and who have attained the normal retirement age determined by their service retirement benefit formula, will receive the same dollar amount for disability retirement as that payable for service retirement. For members who have earned service with multiple CalPERS employers, the benefit attributed to each employer is the total disability allowance multiplied by the ratio of service with a particular employer to the total CalPERS service.

Industrial (Job Related) Disability Retirement

All safety members have this benefit. For miscellaneous members, employers have the option of providing this benefit. An employer may choose to provide the increased benefit option or the improved benefit option.

Eligibility

An employee is eligible for Industrial Disability Retirement if he or she becomes disabled while working, where disabled means the member is unable to perform the duties of the job because of a work-related illness or injury, which is expected to be permanent or to last indefinitely. A CalPERS member who has left active employment within this group is not eligible for this benefit, except to the extent described below.

Standard Benefit

The standard Industrial Disability Retirement benefit is a monthly allowance equal to 50 percent of final compensation.

Increased Benefit (75 percent of Final Compensation)

The increased Industrial Disability Retirement benefit is a monthly allowance equal to 75 percent final compensation for total disability.

Improved Benefit (50 percent to 90 percent of Final Compensation)

The improved Industrial Disability Retirement benefit is a monthly allowance equal to the Workman's Compensation Appeals Board permanent disability rate percentage (if 50 percent or greater, with a maximum of 90 percent) times the final compensation.

For a CalPERS member not actively employed in this group who became disabled while employed by some other CalPERS employer, the benefit is a return of accumulated member contributions with respect to employment in this group. With the standard or increased benefit, a member may also choose to receive the annuitization of the accumulated member contributions.

If a member is eligible for service retirement and if the service retirement benefit is more than the industrial disability retirement benefit, the member may choose to receive the larger benefit.

Post-Retirement Death Benefit

Standard Lump Sum Payment

Upon the death of a retiree, a one-time lump sum payment of $500 will be made to the retiree's designated survivor(s), or to the retiree's estate.

Improved Lump Sum Payment

Employers have the option of providing an improved lump sum death benefit of $600, $2,000, $3,000, $4,000 or $5,000.

Form of Payment for Retirement Allowance

Standard Form of Payment

Generally, the retirement allowance is paid to the retiree in the form of an annuity for as long as he or she is alive. The retiree may choose to provide for a portion of his or her allowance to be paid to any designated beneficiary after the retiree's death. CalPERS provides for a variety of such benefit options, which the retiree pays for by taking a reduction in his or her retirement allowance. Such reduction takes into account the amount to be provided to the beneficiary and the probable duration of payments (based on the ages of the member and beneficiary) made subsequent to the member's death.

Improved Form of Payment (Post-Retirement Survivor Allowance)

Employers have the option to contract for the post-retirement survivor allowance.

For retirement allowances with respect to service subject to the modified formula, 25 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. For retirement allowances with respect to service subject to the full or supplemental formula, 50 percent of the retirement allowance will automatically be continued to certain statutory beneficiaries upon the death of the retiree, without a reduction in the retiree's allowance. This additional benefit is referred to as post-retirement survivor allowance (PRSA) or simply as survivor continuance.

In other words, 25 percent or 50 percent of the allowance, the continuance portion, is paid to the retiree for as long as he or she is alive, and that same amount is continued to the retiree's spouse (or if no eligible spouse, to unmarried child(ren) until they attain age 18; or, if no eligible child(ren), to a qualifying dependent parent) for the rest of his or her lifetime. This benefit will not be discontinued in the event the spouse remarries.

The remaining 75 percent or 50 percent of the retirement allowance, which may be referred to as the option portion of the benefit, is paid to the retiree as an annuity for as long as he or she is alive. Or, the retiree may choose to provide for some of this option portion to be paid to any designated beneficiary after the retiree's death. Benefit options applicable to the option portion are the same as those offered with the standard form. The reduction is calculated in the same manner but is applied only to the option portion.

Pre-Retirement Death Benefits

Basic Death Benefit

This is a standard benefit.

Eligibility

An employee's beneficiary (or estate) may receive the basic death benefit if the member dies while actively employed. A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this basic death benefit.

Benefit

The basic death benefit is a lump sum in the amount of the member's accumulated contributions, where interest is currently credited at 7.5 percent per year, plus a lump sum in the amount of one month's salary for each completed year of current service, up to a maximum of six months' salary. For purposes of this benefit, one month's salary is defined as the member's average monthly full-time rate of compensation during the 12 months preceding death.

1957 Survivor Benefit

This is a standard benefit.

Eligibility

An employee's *eligible survivor(s)* may receive the 1957 Survivor benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member must be actively employed with the CalPERS employer providing this benefit to be eligible for this benefit. An eligible survivor means the surviving spouse to whom the member was married at least one year before death or, if there is no eligible spouse, to the member's unmarried child(ren) under age 18. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this 1957 Survivor benefit.

Benefit

The 1957 Survivor benefit is a monthly allowance equal to one-half of the unmodified service retirement benefit that the member would have been entitled to receive if the member had retired on the date of his or her death. If the benefit is payable to the spouse, the benefit is discontinued upon the death of the spouse. If the benefit is payable to dependent child(ren), the benefit will be discontinued upon death or attainment of age 18, unless the child(ren) is disabled. The total amount paid will be at least equal to the basic death benefit.

Optional Settlement 2W Death Benefit

This is an optional benefit.

Eligibility

An employee's *eligible survivor* may receive the Optional Settlement 2W Death benefit if the member dies while actively employed, has attained at least age 50 for classic and safety PEPRA members and age 52 for miscellaneous PEPRA members, and has at least 5 years of credited service (total service across all CalPERS employers and with certain other retirement systems with which CalPERS has reciprocity agreements). A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married at least one year before death. A member's survivor who is eligible for any other pre-retirement death benefit may choose to receive that death benefit instead of this Optional Settlement 2W Death benefit.

Benefit

The Optional Settlement 2W Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Special Death Benefit

This is a standard benefit for safety members. An employer may elect to provide this benefit for miscellaneous members.

Eligibility

An employee's *eligible survivor(s)* may receive the special death benefit if the member dies while actively employed and the death is job-related. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 22. An eligible survivor who chooses to receive this benefit will not receive any other death benefit.

Benefit

The special death benefit is a monthly allowance equal to 50 percent of final compensation, and will be increased whenever the compensation paid to active employees is increased but ceasing to increase when the member would have attained age 50. The allowance is payable to the surviving spouse until death at which time the allowance is continued to any unmarried child(ren) under age 22. There is a guarantee that the total amount paid will at least equal the basic death benefit.

If the member's death is the result of an accident or injury caused by external violence or physical force incurred in the performance of the member's duty, and there are *eligible* surviving child(ren) (*eligible* means unmarried child(ren) under age 22) in addition to an eligible spouse, then an **additional monthly allowance** is paid equal to the following:

- if 1 eligible child: 12.5 percent of final compensation
- if 2 eligible children: 20.0 percent of final compensation
- if 3 or more eligible children: 25.0 percent of final compensation

Alternate Death Benefit for Local Fire Members

This is an optional benefit available only to local fire members.

Eligibility

An employee's *eligible survivor(s)* may receive the alternate death benefit in lieu of the basic death benefit or the 1957 Survivor benefit if the member dies while actively employed and has at least 20 years of total CalPERS service. A CalPERS member who is no longer actively employed with **any** CalPERS employer is not eligible for this benefit. An *eligible survivor* means the surviving spouse to whom the member was married prior to the onset of the injury or illness that resulted in death. If there is no eligible spouse, an eligible survivor means the member's unmarried child(ren) under age 18.

Benefit

The Alternate Death benefit is a monthly allowance equal to the service retirement benefit that the member would have received had the member retired on the date of his or her death and elected Optional Settlement 2W. (A retiree who elects Optional Settlement 2W receives an allowance that has been reduced so that it will continue to be paid after his or her death to a surviving beneficiary.) If the member has not yet attained age 50, the benefit is equal to that which would be payable if the member had retired at age 50, based on service credited at the time of death. The allowance is payable as long as the surviving spouse lives, at which time it is continued to any unmarried child(ren) under age 18, if applicable. The total amount paid will be at least equal to the basic death benefit.

Cost-of-Living Adjustments (COLA)

Standard Benefit

Retirement and survivor allowances are adjusted each year in May for cost of living, beginning the second calendar year after the year of retirement. The standard cost-of-living adjustment (COLA) is 2 percent. Annual adjustments are calculated by first determining the lesser of 1) 2 percent compounded from the end of the year of retirement or 2) actual rate of inflation. The resulting increase is divided by the total increase provided in prior years. For any particular year, the COLA adjustment may be less than 2 percent (when the rate of inflation is low), may be greater than the rate of inflation (when the rate of inflation is low after several years of high inflation) or may even be greater than 2 percent (when inflation is high after several years of low inflation).

Improved Benefit

Employers have the option of providing a COLA of 3 percent, 4 percent, or 5 percent, determined in the same manner as described above for the standard 2 percent COLA. An improved COLA is not available with the 1.5% at 65 formula.

Purchasing Power Protection Allowance (PPPA)

Retirement and survivor allowances are protected against inflation by PPPA. PPPA benefits are cost-of-living adjustments that are intended to maintain an individual's allowance at 80 percent of the initial allowance at retirement adjusted for inflation since retirement. The PPPA benefit will be coordinated with other cost-of-living adjustments provided under the plan.

Employee Contributions

Each employee contributes toward his or her retirement based upon the retirement formula. The standard employee contribution is as described below.

- The percent contributed below the monthly compensation breakpoint is 0 percent.
- The monthly compensation breakpoint is $0 for full and supplemental formula members and $133.33 for employees covered by the modified formula.
- The percent contributed above the monthly compensation breakpoint depends upon the benefit formula, as shown in the table below.

Benefit Formula	Percent Contributed above the Breakpoint
Miscellaneous, 1.5% at 65	2%
Miscellaneous, 2% at 60	7%
Miscellaneous, 2% at 55	7%
Miscellaneous, 2.5% at 55	8%
Miscellaneous, 2.7% at 55	8%
Miscellaneous, 3% at 60	8%
Miscellaneous, 2% at 62	50% of the Total Normal Cost
Miscellaneous, 1.5% at 65	50% of the Total Normal Cost
Safety, 1/2 at 55	Varies by entry age
Safety, 2% at 55	7%
Safety, 2% at 50	9%
Safety, 3% at 55	9%
Safety, 3% at 50	9%
Safety, 2% at 57	50% of the Total Normal Cost
Safety, 2.5% at 57	50% of the Total Normal Cost
Safety, 2.7% at 57	50% of the Total Normal Cost

The employer may choose to "pick-up" these contributions for classic members (Employer Paid Member Contributions or EPMC). EPMC is prohibited for new PEPRA members.

An employer may also include Employee Cost Sharing in the contract, where employees agree to share the cost of the employer contribution. These contributions are paid in addition to the member contribution.

Auxiliary organizations of the CSUC system may elect reduced contribution rates, in which case the offset is $317 and the contribution rate is 6 percent if members are not covered by Social Security. If members are covered by Social Security, the offset is $513 and the contribution rate is 5 percent.

Refund of Employee Contributions

If the member's service with the employer ends, and if the member does not satisfy the eligibility conditions for any of the retirement benefits above, the member may elect to receive a refund of his or her employee contributions, which are credited with 6 percent interest compounded annually.

1959 Survivor Benefit

This is a pre-retirement death benefit available only to members not covered by Social Security. Any agency joining CalPERS subsequent to 1993 is required to provide this benefit if the members are not covered by Social Security. The benefit is optional for agencies joining CalPERS prior to 1994. Levels 1, 2 and 3 are now closed. Any new agency or any agency wishing to add this benefit or increase the current level may only choose the 4th or Indexed Level.

This benefit is not included in the results presented in this valuation. More information on this benefit is available on the CalPERS website at www.calpers.ca.gov.

APPENDIX C

PARTICIPANT DATA

- **SUMMARY OF VALUATION DATA**
- **ACTIVE MEMBERS**
- **TRANSFERRED AND TERMINATED MEMBERS**
- **RETIRED MEMBERS AND BENEFICIARIES**

Summary of Valuation Data

	June 30, 2015	June 30, 2016
1. **Active Members**		
a) Counts	134	137
b) Average Attained Age	47.33	46.63
c) Average Entry Age to Rate Plan	35.58	35.52
d) Average Years of Service	11.75	11.11
e) Average Annual Covered Pay	$ 108,178	$ 110,616
f) Annual Covered Payroll	14,495,883	15,154,419
g) Projected Annual Payroll for Contribution Year	15,840,043	16,559,643
h) Present Value of Future Payroll	109,608,724	118,923,926
2. **Transferred Members**		
a) Counts	37	39
b) Average Attained Age	50.14	49.74
c) Average Years of Service	5.36	5.06
d) Average Annual Covered Pay	$ 106,919	$ 110,158
3. **Terminated Members**		
a) Counts	29	29
b) Average Attained Age	45.07	46.03
c) Average Years of Service	3.32	3.37
d) Average Annual Covered Pay	$ 61,441	$ 63,639
4. **Retired Members and Beneficiaries**		
a) Counts	162	172
b) Average Attained Age	68.33	68.81
c) Average Annual Benefits	$ 35,466	$ 37,210
5. **Active to Retired Ratio** [(1a) / (4a)]	0.83	0.80

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Average Annual Benefits represents benefit amounts payable by this plan only. Some members may have service with another agency and would therefore have a larger total benefit than would be included as part of the average shown here.

Active Members

Counts of members included in the valuation are counts of the records processed by the valuation. Multiple records may exist for those who have service in more than one valuation group. This does not result in double counting of liabilities.

Distribution of Active Members by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**
15-24	2	0	0	0	0	0	2
25-29	3	1	0	0	0	0	4
30-34	9	5	0	0	0	0	14
35-39	7	5	9	0	0	0	21
40-44	8	1	2	2	0	0	13
45-49	9	8	9	3	2	2	33
50-54	3	1	4	2	5	5	20
55-59	2	3	2	4	2	4	17
60-64	1	0	4	0	0	3	8
65 and over	0	0	0	1	4	0	5
All Ages	**44**	**24**	**30**	**12**	**13**	**14**	**137**

Distribution of Average Annual Salaries by Age and Service

	Years of Service at Valuation Date						
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Average**
15-24	$79,415	$0	$0	$0	$0	$0	$79,415
25-29	82,956	121,012	0	0	0	0	92,470
30-34	79,406	105,811	0	0	0	0	88,836
35-39	90,046	110,303	119,083	0	0	0	107,314
40-44	112,999	106,024	133,451	116,582	0	0	116,160
45-49	98,498	109,414	106,664	124,248	170,046	197,323	116,038
50-54	141,874	107,747	112,123	74,030	140,907	113,008	119,975
55-59	151,848	112,071	124,694	131,592	108,684	103,854	120,497
60-64	108,368	0	123,205	0	0	114,125	117,945
65 and over	0	0	0	85,691	77,970	0	79,514
All Ages	**$99,564**	**$109,453**	**$116,311**	**$113,836**	**$121,067**	**$122,677**	**$110,616**

Transferred and Terminated Members

Distribution of Transfers to Other CalPERS Plans by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	0	0	0	0	0	0	0	$0
25-29	1	0	0	0	0	0	1	91,774
30-34	0	1	0	0	0	0	1	53,502
35-39	4	1	0	0	0	0	5	112,273
40-44	3	1	0	0	0	0	4	93,832
45-49	5	2	0	0	0	0	7	104,829
50-54	5	1	1	0	0	1	8	110,426
55-59	3	5	1	1	0	0	10	127,569
60-64	1	1	0	0	0	0	2	97,580
65 and over	1	0	0	0	0	0	1	126,124
All Ages	**23**	**12**	**2**	**1**	**0**	**1**	**39**	**110,158**

Distribution of Terminated Participants with Funds on Deposit by Age, Service, and average Salary

	Years of Service at Valuation Date							
Attained Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-25**	**25+**	**Total**	**Average Salary**
15-24	0	0	0	0	0	0	0	$0
25-29	1	0	0	0	0	0	1	31,709
30-34	1	1	0	0	0	0	2	69,604
35-39	3	0	0	0	0	0	3	63,370
40-44	6	1	0	0	0	0	7	71,096
45-49	3	0	0	0	0	0	3	76,186
50-54	4	2	1	1	1	0	9	60,365
55-59	4	0	0	0	0	0	4	53,743
60-64	0	0	0	0	0	0	0	0
65 and over	0	0	0	0	0	0	0	0
All Ages	**22**	**4**	**1**	**1**	**1**	**0**	**29**	**63,639**

Retired Members and Beneficiaries

Distribution of Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 30	0	0	0	0	0	0	0
30-34	0	0	0	0	0	0	0
35-39	0	0	0	0	0	0	0
40-44	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0
50-54	3	1	0	0	0	0	4
55-59	18	2	0	0	0	0	20
60-64	33	1	0	0	0	3	37
65-69	45	2	0	0	0	1	48
70-74	20	0	0	0	0	3	23
75-79	12	2	0	0	0	2	16
80-84	11	2	0	0	0	2	15
85 and Over	6	1	0	0	0	2	9
All Ages	**148**	**11**	**0**	**0**	**0**	**13**	**172**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Age and Retirement Type*

Attained Age	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 30	$0	$0	$0	$0	$0	$0	$0
30-34	0	0	0	0	0	0	0
35-39	0	0	0	0	0	0	0
40-44	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0
50-54	66,822	22,127	0	0	0	0	55,648
55-59	31,280	16,867	0	0	0	0	29,839
60-64	39,785	26,572	0	0	0	10,798	37,078
65-69	36,158	25,612	0	0	0	10,869	35,191
70-74	56,540	0	0	0	0	59,710	56,953
75-79	34,601	14,293	0	0	0	49,793	33,961
80-84	36,848	4,894	0	0	0	26,907	31,262
85 and Over	22,227	17,072	0	0	0	23,504	21,938
All Ages	**$39,110**	**$17,191**	**$0**	**$0**	**$0**	**$32,523**	**$37,210**

Retired Members and Beneficiaries (continued)

Distribution of Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Total
Under 5 Yrs	49	0	0	0	0	4	53
5-9	34	0	0	0	0	5	39
10-14	31	1	0	0	0	2	34
15-19	16	3	0	0	0	1	20
20-24	10	3	0	0	0	1	14
25-29	4	1	0	0	0	0	5
30 and Over	4	3	0	0	0	0	7
All Years	**148**	**11**	**0**	**0**	**0**	**13**	**172**

Distribution of Average Annual Disbursements to Retirees and Beneficiaries by Years Retired and Retirement Type*

Years Retired	Service Retirement	Non-Industrial Disability	Industrial Disability	Non-Industrial Death	Industrial Death	Death After Retirement	Average
Under 5 Yrs	$45,505	$0	$0	$0	$0	$40,938	$45,161
5-9	39,138	0	0	0	0	21,126	36,829
10-14	38,803	22,127	0	0	0	41,731	38,485
15-19	34,129	21,776	0	0	0	37,680	32,453
20-24	34,379	22,235	0	0	0	32,273	31,626
25-29	21,594	8,080	0	0	0	0	18,891
30 and Over	12,162	8,953	0	0	0	0	10,787
All Years	**$39,110**	**$17,191**	**$0**	**$0**	**$0**	**$32,523**	**$37,210**

* Counts of members do not include alternate payees receiving benefits while the member is still working. Therefore, the total counts may not match information on page 25 of the report. Multiple records may exist for those who have service in more than one coverage group. This does not result in double counting of liabilities.

APPENDIX D

DEVELOPMENT OF PEPRA MEMBER CONTRIBUTION RATES

Development of PEPRA Members Contribution Rates

The table below shows the determination of the Member contribution rates based on 50 percent of the Total Normal Cost for each respective plan on June 30, 2016.

Assembly Bill (AB) 340 created PEPRA that implemented new benefit formulas and a final compensation period as well as new contribution requirements for new employees. In accordance with Section Code 7522.30(b), "new members … shall have an initial contribution rate of at least 50 percent of the normal cost rate." The normal cost for the plan is dependent on the benefit levels, actuarial assumptions and demographics of the plan particularly the entry age into the plan. Should the total normal cost of the plan change by one percent or more from the base total normal cost established for the plan, the new member rate shall be 50 percent of the new normal cost rounded to the nearest quarter percent.

		Basis for Current Rate		Rates Effective July 1, 2018			
Rate Plan Identifier	**Plan**	**Total Normal Cost**	**Member Rate**	**Total Normal Cost**	**Change**	**Change Needed**	**Member Rate**
26482	Miscellaneous PEPRA	12.500%	6.250%	12.139%	(0.361%)	No	6.250%

For a description of the methods used to determine the Total Normal Cost for this purpose, please see the "PEPRA Normal Cost Rate Methodology" section in Appendix A.

APPENDIX E

GLOSSARY OF ACTUARIAL TERMS

Glossary of Actuarial Terms

Accrued Liability *(also called Actuarial Accrued Liability or Entry Age Normal Accrued Liability)*
The total dollars needed as of the valuation date to fund all benefits earned in the past for *current* members.

Actuarial Assumptions
Assumptions made about certain events that will affect pension costs. Assumptions generally can be broken down into two categories: demographic and economic. Demographic assumptions include such things as mortality, disability and retirement rates. Economic assumptions include discount rate, salary growth and inflation.

Actuarial Methods
Procedures employed by actuaries to achieve certain funding goals of a pension plan. Actuarial methods include funding method, setting the length of time to fund the Accrued Liability and determining the Value of Assets.

Actuarial Valuation
The determination, as of a valuation date of the Normal Cost, Accrued liability, and related actuarial present values for a pension plan. These valuations are performed annually or when an employer is contemplating a change to their plan provisions.

Amortization Bases
Separate payment schedules for different portions of the Unfunded Liability. The total Unfunded Liability of a Risk Pool or non-pooled plan can be segregated by "cause," creating "bases" and each such base will be separately amortized and paid for over a specific period of time. However, all bases are amortized using investment and payroll assumptions from the current valuation. This can be likened to a home having a first mortgage of 24 years remaining payments and a second mortgage that has 10 years remaining payments. Each base or each mortgage note has its own terms (payment period, principal, etc.)

Generally, in an actuarial valuation, the separate bases consist of changes in unfunded liability due to contract amendments, actuarial assumption changes, actuarial methodology changes, and/or gains and losses. Payment periods are determined by Board policy and vary based on the cause of the change.

Amortization Period
The number of years required to pay off an Amortization Base.

Classic Member (under PEPRA)
A classic member is a member who joined CalPERS prior to January, 1, 2013 and who is not defined as a new member under PEPRA. (See definition of new member below)

Discount Rate Assumption
The actuarial assumption that was called "investment return" in earlier CalPERS reports or "actuarial interest rate" in Section 20014 of the California Public Employees' Retirement Law (PERL).

Entry Age
The earliest age at which a plan member begins to accrue benefits under a defined benefit pension plan. In most cases, this is the age of the member on their date of hire.

Entry Age Normal Cost Method
An actuarial cost method designed to fund a member's total plan benefit over the course of his or her career. This method is designed to yield a rate expressed as a level percentage of payroll.
(The assumed retirement age less the entry age is the amount of time required to fund a member's total benefit. Generally, the older a member on the date of hire, the greater the entry age normal cost. This is mainly because there is less time to earn investment income to fund the future benefits.)

Fresh Start
A Fresh Start is when multiple amortization bases are collapsed to one base and amortized together over a new funding period.

Funded Status
A measure of how well funded, or how "on track" a plan or risk pool is with respect to assets versus accrued liabilities. A ratio greater than 100 percent means the plan or risk pool has more assets than liabilities and a ratio less than 100 percent means liabilities are greater than assets.

GASB 68
Statement No. 68 of the Governmental Accounting Standards Board. The accounting standard governing a state or local governmental employer’s accounting and financial reporting for pensions. GASB 68 replaces GASB 27 effective the first fiscal year beginning after June 15, 2014.

New Member (under PEPRA)
A new member includes an individual who becomes a member of a public retirement system for the first time on or after January 1, 2013, and who was not a member of another public retirement system prior to that date, and who is not subject to reciprocity with another public retirement system.

Normal Cost
The annual cost of service accrual for the upcoming fiscal year for active employees. The normal cost should be viewed as the long term contribution rate.

Pension Actuary
A business professional that is authorized by the Society of Actuaries, and the American Academy of Actuaries to perform the calculations necessary to properly fund a pension plan.

PEPRA
The California Public Employees’ Pension Reform Act of 2013

Prepayment Contribution
A payment made by the employer to reduce or eliminate the year’s required employer contribution.

Present Value of Benefits (PVB)
The total dollars needed as of the valuation date to fund all benefits earned in the past or expected to be earned in the future for *current* members.

Unfunded Accrued Liability (UAL)
When a plan or pool’s Value of Assets is less than its Accrued Liability, the difference is the plan or pool’s Unfunded Accrued Liability (or unfunded liability). If the unfunded liability is positive, the plan or pool will have to pay contributions exceeding the Normal Cost.

UNION SANITARY DISTRICT

DATE: February 20, 2018

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Sami E. Ghossain, Manager of Technical Services
Raymond Chau, CIP Coach
Kevin Chun, Associate Engineer

SUBJECT: Agenda Item No. 9 - Meeting of February 26, 2018
Authorize the General Manager to Execute Task Order No. 2 with CH2M HILL Engineers, Inc. for the Odor Control Alternatives Study

Recommendation

Staff recommends the Board authorize the General Manager to execute Task Order No. 2 with CH2M HILL Engineers, Inc. (CH2M) in the amount of $190,033 for the Odor Control Alternatives Study.

Funds for this project have been budgeted in the Special Projects Fund.

Background

The District constructed an odor scrubber system in the mid-1980s at the Alvarado Wastewater Treatment Plant (WWTP). The odor scrubber system consists of 18 atomized mist wet scrubber towers and a chemical delivery system that convey sodium hypochlorite to the scrubber towers. The 18 scrubber towers have been in operation since constructed, though some upgrades have been made to the system. Figure 1 shows the location of the existing scrubber towers and Figures 2 through 4 show the odor control improvements made in recent years.

Odor Control Evaluation – 2007 and 2008

The District contracted with Brown & Caldwell (BC) to conduct Phase 1 of the Odor Control Evaluation in September 2007. The evaluation focused on the odor scrubber system effectiveness and overall condition. BC's key findings were that some of the odor control scrubbers showed variable performance on hydrogen sulfide removal and needed to be rehabilitated/modified. The consultant also recommended that a more detailed study needed to be conducted of the whole odor control system to develop a more comprehensive rehabilitation plan of the existing odor control system.

The District contracted with BC to conduct Phase 2 of the Odor Control Evaluation in July 2008. BC's findings confirmed the recommendation for several odor control enhancements and further identified a packed tower chemical scrubbing system as an option for future consideration if deemed necessary.

Odor Control Study Update – 2014

In 2014, the District contracted with BC to consider advancements made in odor control technology systems since completion of the Phase 2 evaluation in 2009. Although the District believes the current odor control system is performing adequately, it seemed prudent to see if there were other technologies that could reduce operating costs or provide greater reliability.

The study concluded that the proposed advanced mist scrubbing alternative would require a low capital cost investment for all process areas, but annual O&M costs would be relatively high, primarily due to the high labor cost associated with maintaining multiple new pieces of equipment. Conversely, the activated carbon adsorption alternative would require a much higher capital investment than the advanced mist scrubbing alternative, but annual labor costs to maintain the relatively simple adsorbers are lower.

Odor Control Study Update – 2017

Previous odor control evaluations mainly focused on technologies that were similar to the existing technology the District was already using and fit within the constraints of the existing property. Staff recommended to conduct additional air sampling, develop and run a new odor dispersion model, and mainly focus on evaluating alternative odor control technologies not identified in previous odor control evaluations. This would potentially provide the District other options to evaluate when considering any future odor control enhancements if deemed necessary.

On January 9, 2017, the Board authorized the General Manager to execute Task Order No. 1 with CH2M in the amount of $139,801 to conduct the Odor Control Alternatives Study.

The Study's scope of services included the following tasks:

1. Review findings from previous odor control and sampling reports and related data.

2. Conduct air sampling at the WWTP and in the general vicinity where recent complaints have occurred to help identify potential nuisance level odorous compounds present and possible sources.
3. Develop and conduct a dispersion model of the WWTP facilities, odor sources, and odor receptors in the adjacent properties under different weather conditions.
4. Summarize findings, evaluate odor control alternatives not included in previous odor control studies, and recommended odor control alternatives for implementation, if deemed necessary. The recommended alternatives will include life cycle costs.

CH2M completed tasks 1 through 3 and expended approximately 76% of the budget of Task Order No. 1. CH2M completed three air sampling events at the WWTP and in the general vicinity where recent odor complaints have occurred in April, June, and August 2017 and developed the dispersion model. However, during the air sampling events, CH2M and staff identified that vapor phase odors at the WWTP seemed to be significantly reduced in the dispersion model with the occasional dosing of various chemicals in the collection system.

Staff believes there is an opportunity to minimize odors and odor control capital improvement costs at the WWTP if odors in the collection system can be minimized via the development refinement and implementation of a source control program. This alternative approach utilizes source control as a strategy and may also yield additional activated sludge process benefits by reducing the septicity of the influent entering the treatment plant. Staff would like to explore this further with a second phase of the current Odor Control Alternatives Study.

The objective of the proposed Task Order No. 2 is to authorize additional services with CH2M to conduct sampling and evaluation of the collection system and force main odors and to conduct bench tests of various chemicals to determine the chemical dosing rates and level of odor reduction in the wastewater before it reaches the WWTP. CH2M will also collect an air sample at the marsh located west of the WWTP to determine the background odors upstream of the prevailing northwesterly wind conditions. In addition, CH2M will assist in developing a strategy to meet the Bay Area Air Quality Management District's (BAAQMD's) anticipated more stringent air quality regulations, *Regulation 11, Rule 18: Reduction of Risk from Air Toxics Emissions at Existing Facilities* (Rule 11-18).

In November 2017, the BAAQMD adopted Rule 11-18 to improve air quality and evaluate health risks from toxic emissions from existing facilities ranging in size from large-scale plants like factories, oil refineries, and WWTPs to smaller operations like back-up generators and gas stations. The BAAQMD estimates that hundreds of facilities throughout the Bay Area may be subject to new rule.

Task Order No. 2 will include the following scope of services:

1. Conduct odor sampling and modeling to determine wastewater odor characteristics within the collection system and force mains. CH2M will also conduct odor sampling of the marsh area adjacent to the plant to establish baseline data.
2. Conduct bench-scale testing of various chemical alternatives to determine odor control and dosing rates in the collection system and force mains.
3. Develop an odor model to evaluate current odor impacts in the collection system, identify wastewater characteristics, and simulate different chemical dosing schemes. CH2M will recommend a chemical dosing strategy that will provide the dosing chemical, location(s), quantity, and frequency that will best reduce sulfides in the collection and transport systems.
4. Summarize findings, evaluate odor control alternatives not included in previous odor control studies, and recommend an implementation plan with odor control alternatives. The alternatives will include life cycle cost estimates.
5. Update the District's toxic air contaminant emissions inventory for BAAQMD Rule 11-18 based on available facility data.
6. Develop a BAAQMD Rule 11-18 strategy.

The scope of services and their respective fees are summarized as follows:

Task No.	Task Description	Fee
1	Collection System Sampling	$68,032
2	Collection System Jar Testing	$14,300
3	Collection System Modeling	$33,192
4	Technology Alternative Evaluation	$30,969
5	Draft and Final Technical Memorandum	$10,258
6	Update TAC Emission Inventory	$14,768
7	Develop Strategy for BAAQMD Rule 11-18	$11,474
8	Project Management	$7,040
	Total Not-to-Exceed Fee	**$190,033**

Staff believes the total not-to-exceed fee of $190,033 is reasonable given the effort needed to conduct the vapor and liquid sampling of the collection system in both wet and dry weather seasons, development of a collection systems dispersion model, and preparation of a BAAQMD Rule 11-18 strategy.

The total fee for the Project's agreement with CH2M are summarized in the table below:

Description	Fee
Task Order No. 1 – WWTP Odor Sampling	$139,801
Task Order No. 2 – Source Control Sampling Plan & BAAQMD Rule 11/18 Strategy	$190,033
Total for this Agreement	**$329,834**

Schedule

Staff anticipates completion of the study by summer 2018. CH2M will conduct two separate air and liquid sampling events during the current winter season and spring of 2018. After the last sampling event, CH2M will conduct a workshop with staff to present the findings, conclusions and recommendations.

Staff recommends the Board authorize the General Manager to execute Task Order No. 2 with CH2M HILL Engineers, Inc. in the amount of $190,033 for the Odor Control Alternatives Study.

PRE/SEG/RC/KC;dl

Attachments: Figure 1 – Site Map
Figure 2 – Existing Scrubber Towers
Figure 3 – Existing Odor Dispersion Wall
Figure 4 – Existing Piian Mist System
Task Order No. 2

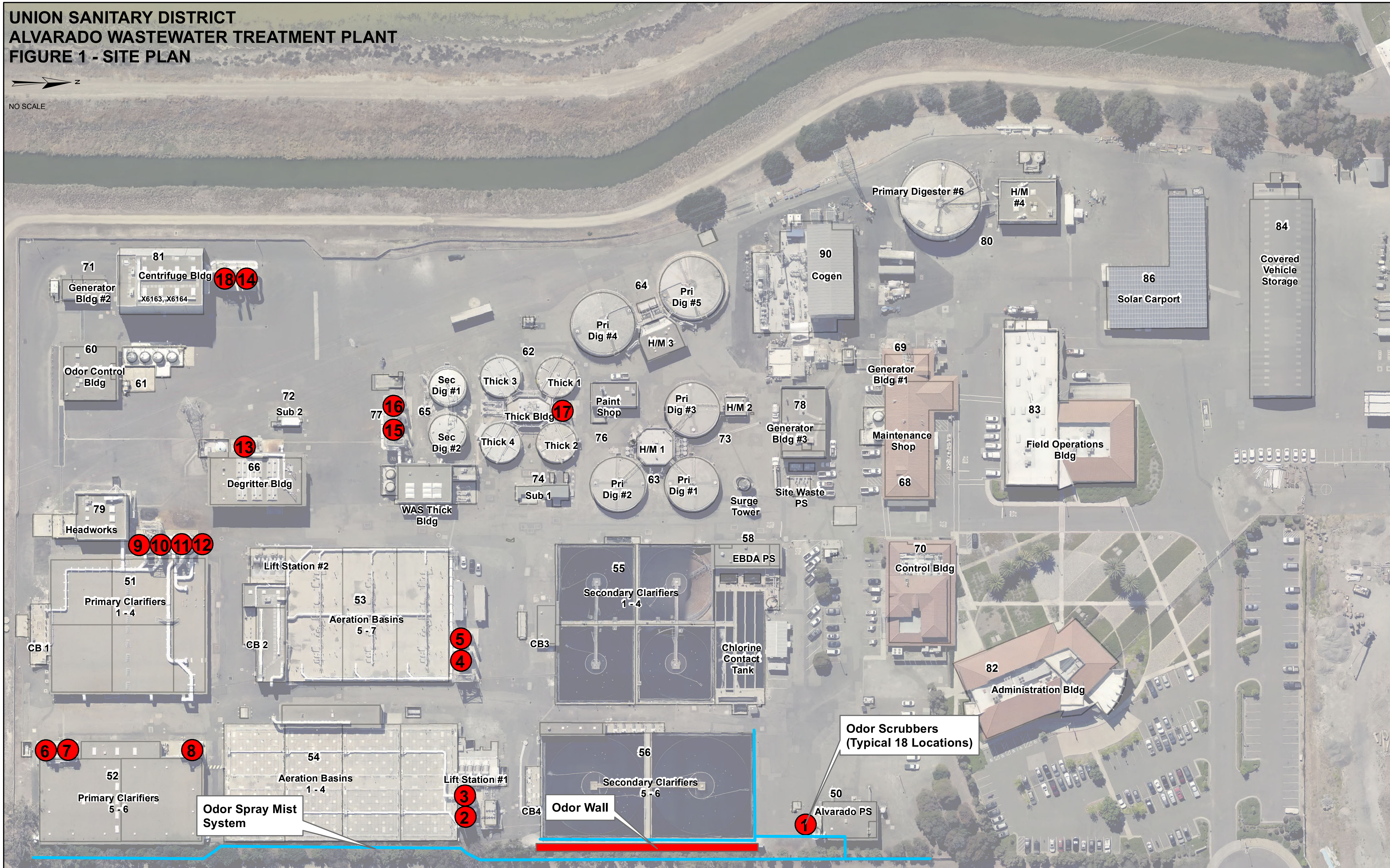

UNION SANITARY DISTRICT
ALVARADO WASTEWATER TREATMENT PLANT
FIGURE 1 - SITE PLAN
N
NO SCALE
71
Generator Bldg #2
81
Centrifuge Bldg
X6163, X6164
18
14
60
Odor Control Bldg
61
72
Sub 2
13
66
Degritter Bldg
79
Headworks
9
10
11
12
77
16
15
65
Sec Dig #1
Sec Dig #2
WAS Thick Bldg
Thick 3
Thick 1
62
Thick Bldg
17
Thick 4
Thick 2
74
Sub 1
64
Pri Dig #4
Pri Dig #5
H/M 3
Paint Shop
76
Pri Dig #3
H/M 2
73
H/M 1
63
Pri Dig #2
Pri Dig #1
Surge Tower
90
Cogen
78
Generator Bldg #3
Site Waste PS
Primary Digester #6
80
H/M #4
86
Solar Carport
84
Covered Vehicle Storage
69
Generator Bldg #1
Maintenance Shop
68
83
Field Operations Bldg
51
Primary Clarifiers 1 - 4
CB 1
Lift Station #2
53
Aeration Basins 5 - 7
CB 2
5
4
CB3
58
EBDA PS
55
Secondary Clarifiers 1 - 4
Chlorine Contact Tank
70
Control Bldg
82
Administration Bldg
6
7
8
52
Primary Clarifiers 5 - 6
54
Aeration Basins 1 - 4
Lift Station #1
3
2
CB4
56
Secondary Clarifiers 5 - 6
Odor Spray Mist System
Odor Wall
Odor Scrubbers (Typical 18 Locations)
50
Alvarado PS
1

Figure 2 – Existing Scrubber Towers

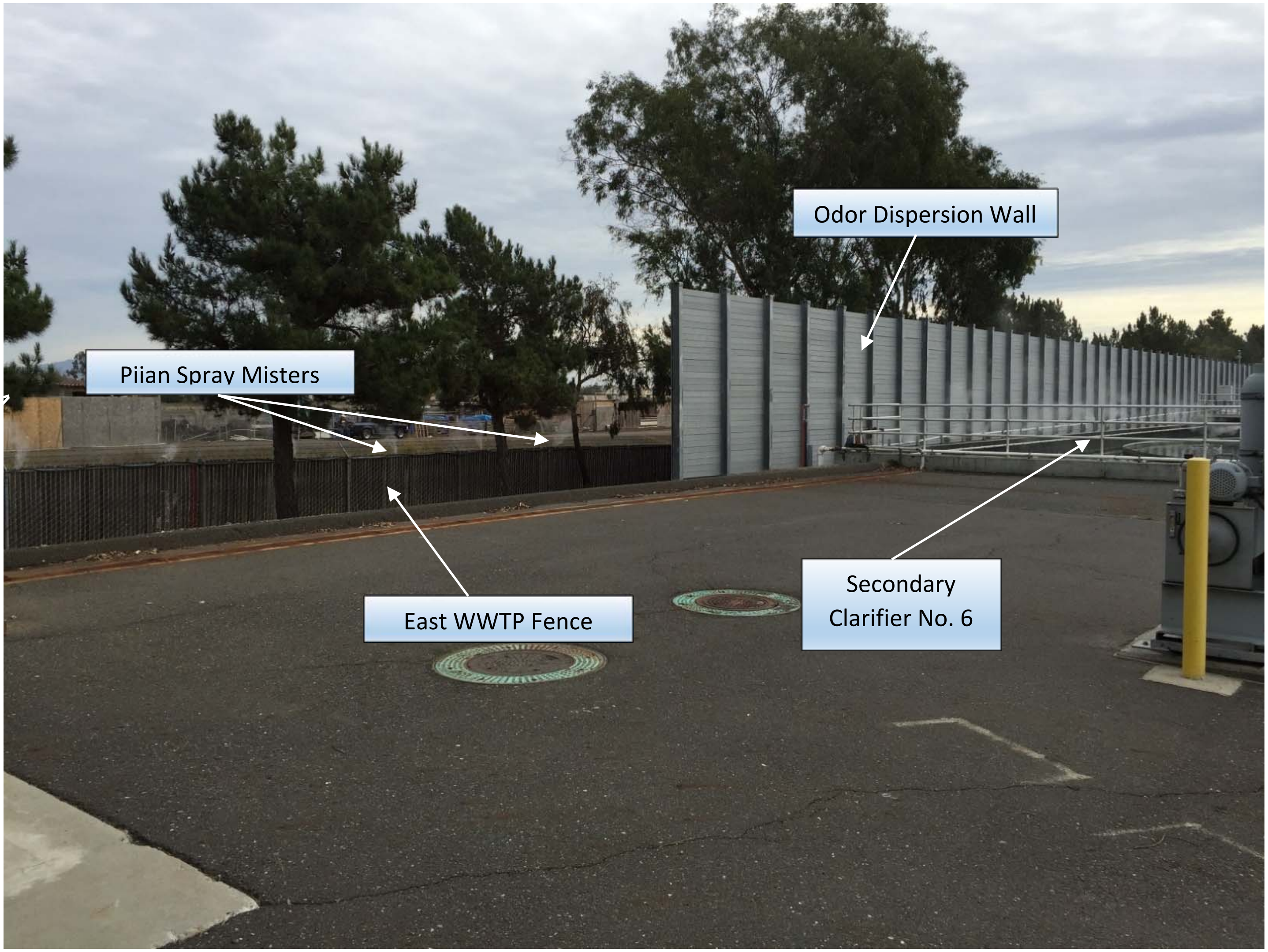


Figure 3 – Existing Odor Dispersion Wall

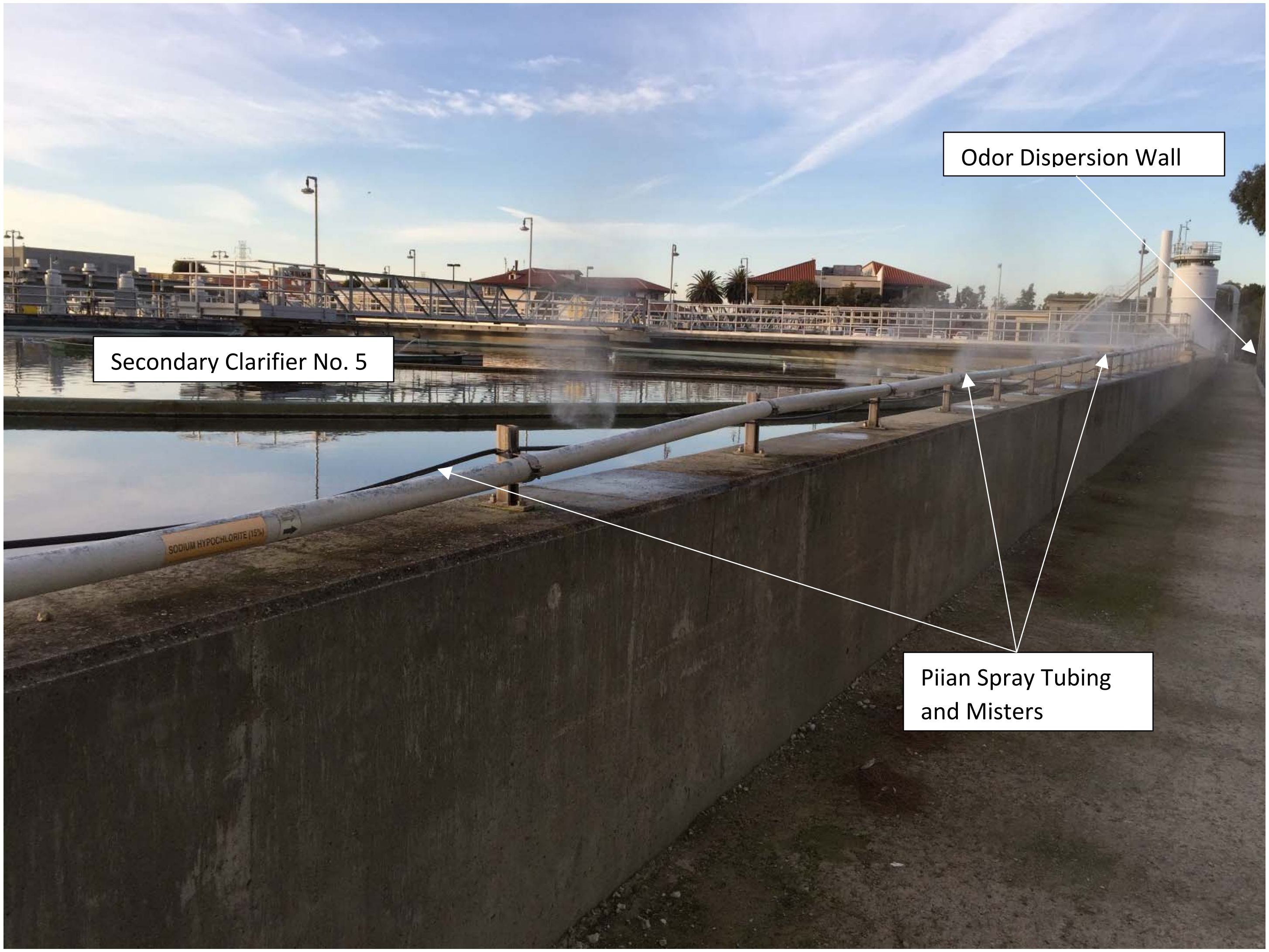


Figure 4 – Existing Piian Mist System

ODOR CONTROL ALTERNATIVES STUDY

TASK ORDER NO. 2

to

AGREEMENT

BETWEEN

UNION SANITARY DISTRICT

AND

CH2M HILL ENGINEERS, INC.

FOR

PROFESSIONAL SERVICES

DATED JANUARY 10, 2017

1. PURPOSE

The purpose of Task Order No. 2 is to authorize the odor sampling and evaluation of the collection system and force main odors and development of a strategy to meet Bay Area Air Quality Management District (BAAQMD) Rule 11-18 air regulations. The scope of services will include:

1. Conduct odor sampling and modeling to determine wastewater odor characteristics within the collection system and force mains.

2. Conduct bench-scale testing of various chemical alternatives to determine odor reduction and dosing rates in the collection system and force mains.

3. Develop an odor model to evaluate current odor impacts in the collection system, identify wastewater characteristics, and simulate different chemical dosing schemes.

4. Prepare a report to summarize findings, evaluate odor control alternatives not included in previous odor control studies, and recommended odor control alternatives for implementation. The recommended alternatives will include life cycle costs.

5. Update the District's Toxic Air Contaminant (TAC) emissions inventory for BAAQMD) Rule 11-18 based on available facility and emission data.

6. Calculate a prioritization score (PS) based on the updated inventory and compare updated inventory and PS to the current BAAQMD inventory and PS.

7. Develop a BAAQMD Rule 11-18 strategy that includes refining emission estimates, performing an anticipatory health risk assessment (HRA), and identifying risk reduction measures and control technologies.

The project elements described above are further described in the below scope of services.

2. PROJECT COORDINATION

All work related to this task order shall be coordinated through the District's Project Manager, Kevin Chun.

3. SCOPE OF SERVICES

Task 1: Collection System Sampling

Collection system sampling will consist of liquid phase sampling and in-field analysis to determine wastewater odor characteristics and headspace characteristics within the collection system. Analysis would quantify the following wastewater characteristics; total Biological Oxygen Demand (BOD), total Carbon Oxygen Demand (COD), filtered COD, volatile fatty acids (VFA's), alkalinity, ammonia, total sulfide, dissolved sulfide, dissolved oxygen and salinity, as well as pH and temperature. Analysis would quantify the following headspace characteristics; pressure, vapor phase hydrogen sulfide (H_2S), total reduced sulfur, and carboxylic acids (using sorption tubes).

The Engineer shall prepare a sampling plan and conduct sampling in the upcoming winter season and spring 2018. Sampling locations would include 4 locations total; one at the front end of the plant and three at specific locations upstream of the plant at manholes. Liquid phase sampling at each location would occur during morning and evening for two days during a single week. Vapor phase sampling, and installation of Odalogs and pressure sensors, at each location would occur for one day during each sampling event.

The Engineer shall conduct additional sampling to include an odor profile method analysis. These samples will require an additional day of sampling and will be conducted concurrently with one of the vapor phase sampling events during winter or spring. The Engineer shall be responsible for collecting air samples using Teflon bags, vacuum chambers, and overnight shipping to an independent third party laboratory.

The Engineer shall conduct vapor phase sampling at the adjacent marsh, using a flux chamber, vacuum chamber, sweep gas, and Tedlar bags. Lab analyses will include an odor panel analysis and reduced sulfur analysis. The District and the Engineer will discuss when marsh conditions are most odorous, and sampling will be conducted during this period.

The Engineer shall conduct an offsite odor survey which includes up to six survey stations within the adjacent community to the east of the Alvarado Wastewater Treatment Plant (WWTP). A hand-held field olfactometer, Nasal Ranger, will be used to obtain odor measurements to identify potential WWTP and non-WWTP odor sources impacting the community. Odor measurements will occur in the early morning, mid-day, late afternoon, and evening. The information recorded for each survey station shall include location, date, time, description, intensity, and meteorological conditions. The survey will assess locations where community members have complained in the past and also look for potential new odor sources in the areas.

Assumptions:

- The Engineer shall be responsible for collecting all samples. District will assist in collecting samples by providing necessary access to manholes.
- The District will provide the necessary traffic control.
- The District will provide previous data from collection system sampling.
- The District will be responsible for opening manhole lids. Hanging of Odalogs and pressure sensors shall be done by the Engineer.
- Three sampling days will be utilized for sample collection in winter 2017 and spring 2018. In-field analyses will use Spectrometers, Odalog units, pressure sensors, and other portable field instruments. Up to 4 locations will be sampled during the sampling event. If more sampling locations are required, the Engineer will use emission factors developed by the modeled results or from using a simpler spreadsheet model to determine the downstream impacts.
- Scheduling of the sampling events shall be conducted when force mains are operating in dual configuration from Newark Pump Station to the Alvarado WWTP.
- The Engineer has budgeted one additional day of sampling for odor profile method analysis. This will be conducted either during the winter or summer sampling event.
- The Engineer shall work directly with an outside private third-party lab to coordinate analysis.
- The Engineer has budgeted for one neighborhood odor survey, which will be conducted in winter 2017.
- The Engineer has budgeted for one vapor phase sample at the adjacent marsh.

Deliverables:

- Draft and final Sampling Plans
- Analysis results

Task 2: Jar Testing

The Engineer shall perform jar testing which will consist of pulling a total of 12 liquid samples in 1-liter high-density polyethylene bottles. Four would be pulled from the Irvington Pump Station, four will be pulled from the Newark PS, and four would be pulled from the Alvarado WWTP inlet sewer pipe (upstream of headworks). All samples would be utilized for bench-scale testing of chemical alternatives including hydrogen peroxide, sodium hypochlorite, ferrous chloride, and magnesium hydroxide. Results of jar testing will determine sulfide reduction performance, required dosing rates, and dosage response curves.

Assumptions:

- The Engineer shall be responsible for collecting all samples and completing jar testing. District will assist in collecting of samples by providing necessary access.
- Gastec tubes will be used for measuring dissolved sulfides and vapor phase hydrogen sulfide during jar testing.
- District will provide a minimum of 4 ft. by 4 ft. lab space for jar testing at the Alvarado WWTP.

Deliverables:

- Draft and final Jar Testing Plan
- Analysis results

Task 3: Collection System Modeling

Develop a Wastewater Aerobic-Anaerobic Transformations in Sewer (WATS) Interceptor Model using results from the liquid phase sampling. The WATS model inputs include flows, collection system physical characteristics including lengths, sizes, and slopes, and sewage characteristics including BOD, COD, dissolved oxygen, dissolved sulfides, temperature, and VFA's. The Engineer shall conduct modeling to evaluate the current odor impacts on the collection system, complete "what-if" mitigation scenarios, and identify the wastewater characteristics feeding to the WWTP. "What-if" scenarios will include simulating different chemical dosing schemes or vapor phase systems placed at different locations within the collection system to evaluate benefits and develop a ranking of approaches. The Engineer shall conduct a workshop to present initial baseline results and "what-if" scenarios.

This task includes a one-time expense for the usage of the WATS modeling software. The expense covers the licensing cost and QA/QC review of the WATS Interceptor collection system model based on sampling data.

Assumptions:

- District will provide existing hydraulic modeling, including sewer data (sewer sizes, flow rates, etc.). If hydraulic modeling data is not available, the District will provide a GIS database.
- Engineer shall evaluate up to four "what-if" scenarios.

Deliverables:

- WATS model results
- Draft and final workshop agenda and PowerPoint files
- Summary meeting minutes

Task 4: Technology Alternative Evaluation

The Engineer shall conduct desk-top evaluation of up to five distinct technology mitigation approaches, including oxidants, pH shifters, iron salts, nitrates, and oxygenation. In addition, current dosing scheme and any recommended measures outlined by U.S. Peroxide (current chemical supplier) will be evaluated and compared to alternative approaches. Life cycle cost comparisons and recommendations will be provided based on expected dosing rates, estimated capital cost and operating costs, qualitative parameters, and performance for chemicals as documented in literature, as observed in Task 2 – Jar Testing, and observed in the Engineer's past projects.

The Engineer will prepare an implementation plan which will consist of three separate collection system mitigation schemes. Two of the mitigation schemes will consist of optimizing existing dosing systems. The third mitigation scheme will include a pilot unit such as Super Oxygenation or Ozone (e.g.; Force5). The implementation plan will be developed in conjunction with District feedback and will include detailed optimization measures, pilot unit set up, and sampling and analysis methodologies. Sampling would be completed during each mitigation scheme and would include sampling at the front end of the plant (liquid phase) as well as at two scrubber systems to determine the impact on vapor phase concentrations.

The Engineer shall conduct three offsite odor surveys, during each of the three mitigation schemes. Each survey will include up to six survey stations within the adjacent community to the east of the Alvarado WWTP. A hand-held field olfactometer, Nasal Ranger, will be used to obtain odor measurements to identify potential WWTP and non-WWTP odor sources impacting the community. Odor measurements will occur in the early morning, mid-day, late afternoon, and evening. The information recorded for each survey station shall include location, date, time, description, intensity, and meteorological conditions. The survey will assess locations where community members have complained in the past and also look for potential new odor sources in the areas.

Assumptions:

- The District will provide data pertaining to existing dosing scheme, including control parameters and set points.
- The District will provide all unit cost information regarding chemical delivery costs.
- The Engineer shall develop up to three mitigation schemes.
- The Engineer has budgeted for three odor surveys.

Deliverables:

- Engineer shall include a narrative of existing and proposed dosing schemes, life cycle cost comparison, implementation plan, and recommendations in the Technical Memorandum.

Task 5: Draft and Final Technical Memorandum

The Engineer shall develop a technical memorandum (TM) to document the findings, and conclusions resulting from collection system sampling, modeling and evaluation. Adjudicate and incorporate all District comments on the draft TM and incorporate the TM into the final Odor Study, associated with Task Order 1.

At the District's request, the Engineer shall discuss the extension of the Centrifuge Building roll-up door on the north side of the truck loading bay, so trucks can load biosolids with the roll-up door closed. As part of this discussion, the Engineer shall calculate the air changes per hour before and after the building extension to determine if any air handling upgrades are required.

The Engineer shall compile data and develop draft agenda and PowerPoint to present a summary of results and findings. The results and findings will be incorporated into the final workshop associated with Task Order No. 1 to present a summary and conclusions associated with collection system sampling and modeling.

Assumptions:

- TM will be incorporated with the Odor Study Report associated with Task Order No. 1.
- Findings will be presented in final workshop associated with Task Order No. 1.
- District will provide Centrifuge Building ventilation as-built drawings and building extension dimensions.

Deliverables:

- One draft submittal TM, in electronic PDF format
- Five hard copies and one electronic PDF copy of the final TM
- Draft and final workshop agenda and PowerPoint files
- Summary meeting minutes

Task 6: Update TAC Emission Inventory and Calculate Prioritization Score

The BAAQMD has proposed a new Rule, 11-18: *Reduction of Risk from Air Toxic Emissions at Existing Facilities*, which was adopted in November 2017. BAAQMD actions under the rule include:

- Updating the facility's PS based on TAC emission estimates derived from annual permit renewal data and BAAQMD database emission factors. BAAQMD has indicated it will adopt the 2016 California Air Pollution Control Officers Association (CAPCOA) prioritization guidance at the same time that Rule 11-18 is adopted.
- Establishing a timeline for rule implementation at individual facilities based on the PS. The WWTP is identified as a Tier 2 (second phase) facility in a preliminary BAAQMD implementation document.
- Working with facilities to update TAC air emission estimates based on available data.

- Performing HRAs following BAAQMD's January 2016 HRA Guideline, which incorporates the Office of Environmental Health Hazard Assessment (OEHHA) and CAPCOA HRA guidance.
- Reviewing facility risk reduction plans.

Facility responsibilities under the rule include:

- Working with BAAQMD staff to provide information relevant to updating the facility air emission inventory.
- If the BAAQMD HRA results in a health risk, either:
    - o Prepare a draft plan within 180 days of notification by BAAQMD to reduce the health risk within three years (3-year extension can be requested) or,
    - o Demonstrate (document) that best available retrofit control technology is implemented or that the health risk is actually no greater than the indices by further refining air emission estimates and performing additional modeling.
- Implement the risk reduction plan and provide annual progress reports to BAAQMD

BAAQMD has also revised its fee regulation, Regulation 3, to include fees for implementation of BAAQMD Rule 11-18.

This proposed scope of work addresses the following objectives:

- Update the facility air emission inventory based on available facility and emission data.
- Calculate the PS based on the updated inventory and compare updated inventory and prioritization score to the current BAAQMD inventory and PS.
- Propose a strategy for addressing BAAQMD Rule 11-18 that may include refining emission estimates, performing an anticipatory HRA, and identifying potential risk reduction measures and best available control technology.

The Engineer shall request from BAAQMD the current TAC emission estimate and PS. The Engineer shall also submit a data request to the BAAQMD to include the District's most recent annual permit renewal throughput information and other plant operating data. The Engineer shall determine the distance to residential, worker, and sensitive receptors. The WWTP emissions will be totaled by TAC and the PS will be determined using the 2016 CAPCOA guidance.

Emissions will be estimated for the following TACs: ammonia, hydrogen sulfide, digester gas flare TACs, diesel particulate matter, wastewater process TACs.

Emissions will be estimated using available emission factors and data including:

- Influent priority pollutant VOC concentration data based on a mass balance assuming all influent volatile priority pollutants are emitted.
- Hydrogen sulfide emissions concentration data from WWTP processes along with plant scrubber data.

- Diesel engine maintenance/test, and emergency hours, typical test loads, and rated particulate emissions factors.
- Source test data for the Cogen engines.
- TriTAC Guidance Document on Control Technology for Air Emissions from Publicly Owned Treatment Works (POTWs) (TriTAC, 1994).
- Joint Emissions Inventory Program (JEIP) (CH2M HILL, 1993).
- Pooled Emission Estimating Program (PEEP) (JM Montgomery, 1990).
- EPA AP-42 Compilation of Air Pollution Emissions Factors.
- Applicable emission factors from other California APCDs or AQMDs.

Assumptions:

- Emission data provided to the Engineer from various sources and BAAQMD is considered the most current database to calculate PS.
- Where gaps are found in emission data, default emission rates and data will be provided and marked as such.

Deliverables:

- Summary table of estimated TAC emissions compared with current BAAQMD values
- Summary table of calculated PS values on a TAC basis compared with BAAQMD values

Task 7: Develop Strategy for Addressing BAAQMD Rule 11-18

The Engineer shall evaluate the TAC emission estimates and prioritization scores developed in Task 6 against Rule 11-18 objectives and identify approaches that the District may use to improve its compliance position in advance of Rule 11-18 adoption. In addition, The Engineer shall provide a list of potential risk reduction opportunities and/or best available control technology based on PS results and source types (e.g. diesel particulate filters for emergency generators).

The Engineer shall prepare a TM that will include the following information:

- Summary of BAAQMD Rule 11-18 requirements, schedule, and fee.
- Summary of TAC emission estimates, TAC-specific prioritization scores, and recommendations for refining emission estimates.
- Recommended scope and approach performing a preliminary HRA, if screening value triggers this requirement.

Deliverables:

- One draft submittal TM, in electronic PDF format
- Five hard copies and one electronic PDF copy of the final TM

Task 8: Project Management

The Engineer shall manage the efforts of the project team members and coordinate with the District's Project Manager. The Engineer shall prepare and submit monthly invoices. Monthly invoices shall be broken down by each task and list a summary of monthly work completed by the Engineer.

Assumptions:

- The project duration will not exceed 8 months

Deliverables:

- Monthly invoices with summary of work completed.

7. PAYMENT TO THE ENGINEER

Compensation shall be on a time and materials cost basis for services provided under Article 2 of this Agreement in accordance with the Billing Rate Schedule contained in Exhibit A except that subconsultants will be billed at actual cost plus 5%, outside services and travel will be billed at actual cost, and mileage will be billed at prevailing IRS standard mileage rate. The billing rate schedule is generally comparable to a labor multiplier of approximately 3.06.

The estimated costs for Tasks 1 through 8, are presented in Exhibit B. Total charges to the District shall not exceed $190,033.

The following table summarizes all task orders and amendments, if any, including those previously executed under the Agreement, ending with this Task Order:

Task Order / Amendment	**Not to Exceed Amount**	**Board Authorization Required?**	**District Staff Approval**
Task Order No. 1	$139,801	Yes	Paul Eldredge
Task Order No. 2	$190,033	Yes	Paul Eldredge
Total	$329,834		

8. TIME OF COMPLETION

The estimated time of completion is based on the project schedule in Exhibit C. The following is a list of significant milestones from Exhibit C:

Milestone	Schedule
Winter 2018 Odor Sampling and Offsite Odor survey	February 2, 2018
Spring 2018 Odor Sampling Event	April 27, 2018

Milestone	Schedule
Complete Collection Systems Modeling	May 25, 2018
Findings and Results Workshop	May 29, 2018
Deliver draft Study Report	June 18, 2018
Deliver final Study Report	July 9, 2018

9. KEY PERSONNEL

Key engineering personnel assigned to Task Order No. 2 are as follows:

Role	Personnel
Project Manager Technical Director QA/QC Manager	Jay Witherspoon Scott Cowden Bart Kraakman
Associate Engineer	Giuseppe Tomasino

Key personnel shall not change except in accordance with Article 8 of the Agreement.

IN WITNESS WHEREOF, the parties hereto have made and executed this Task Order No. 2 as of February ______, 2018 and therewith incorporated it as part of the Agreement.

DISTRICT:

UNION SANITARY DISTRICT

By:

____

Paul R. Eldredge, P.E.
General Manager/District Engineer

Date: _______________________________

ENGINEER:

CH2M HILL ENGINEERS, INC.

By:

____

Jay Witherspoon
Vice President

Date: _______________________________

EXHIBIT A: BILLING RATE SCHEDULE

Professional Engineering Services – Hourly Rates [a]		
Project Manager	Jay Witherspoon	$276
Technical Director	Scott Cowden	$230
QAQC Manager	Bart Kraakman	$188
Environmental Scientist	Monica Wright	$138
Engineer	Giuseppe Tomasino, TBD	$130, $142
Modeling Lead	Alex Demith	$106
Editor	TBD	$149
Subcontracts Administrator	TBD	$114
Accountant	TBD	$82

[a] Labor rates include direct costs, indirect costs, and profit resulting in a raw labor multiplier of 3.06.

Exhibit B: Fee Schedule

WORK TASK DESCRIPTION	Engineer	Modeling Lead	Environmental Scientist	Technical Director	Project Manager	Subcontract Admin	Accountant	Editor	TOTAL HOURS	SUB-TOTAL ($)
	$130	$106	$138	$230	$276	$114	$82	$149		
Task 1 - Collection System Sampling										
Conduct Sampling	96	56		8		16			176	**$22,080**
Odor Profile Method Sampling	20	8		2		4			34	**$4,364**
Offsite Odor Survey	12								12	**$1,560**
Subconsultant Fees										**$5,565**
Lab Fees										**$11,696**
Expenses										**$22,767**
Subtotal										**$68,032**
Task 2 - Jar Testing										
Sampling	30								30	**$3,900**
Testing Plan	8			6					14	**$2,420**
Analysis	24			4					28	**$4,040**
Expenses										**$3,940**
Subtotal										**$14,300**
Task 3 - Collection System Modeling										
Develop WATS Model	16	100		12		4			132	**$15,896**
Conduct "What-If" Scenarios	4	24		16	2				46	**$7,296**
Modeling Fees										**$10,000**
Subtotal										**$33,192**
Task 4 - Technology Alternative Evaluation										
Evaluation	44			16	1				61	**$9,676**
Offsite Odor Survey	36								36	**$4,680**
Sampling	24			4					28	**$4,040**
Lab Fees										**$3,663**
Expenses										**$8,910**
Subtotal										**$30,969**
Task 5 - Draft and Final Technical Memorandum										
Draft TM	28			10	2			2	42	**$6,790**
Final TM	10			4	2			4	20	**$3,368**
Expenses										**$100**
Subtotal										**$10,258**
Task 6 Update TAC Emission Inventory/Calculate PS										
Update TAC Emission Inventory/Calculate PS	40		32	20	2				94	**$14,768**
Subtotal										**$14,768**
Task 7 - Develop Strategy for Addressing BAAQMD Rule 11-18										
Develop Rule 11-18 Strategy TM	30		24	12	4			2	72	**$11,374**
Expenses										**$100**
Subtotal										**$11,474**
Task 8 - Project Management										
Project Management	28				4				32	**$4,744**
Accounting							28		28	**$2,296**
Subtotal										**$7,040**
TOTAL COST	**450**	**188**	**56**	**114**	**17**	**24**	**28**	**8**	**885**	**$190,033**

Notes:

Labor rates include direct costs, indirect costs, and profit resulting in a raw labor multiplier of 3.06

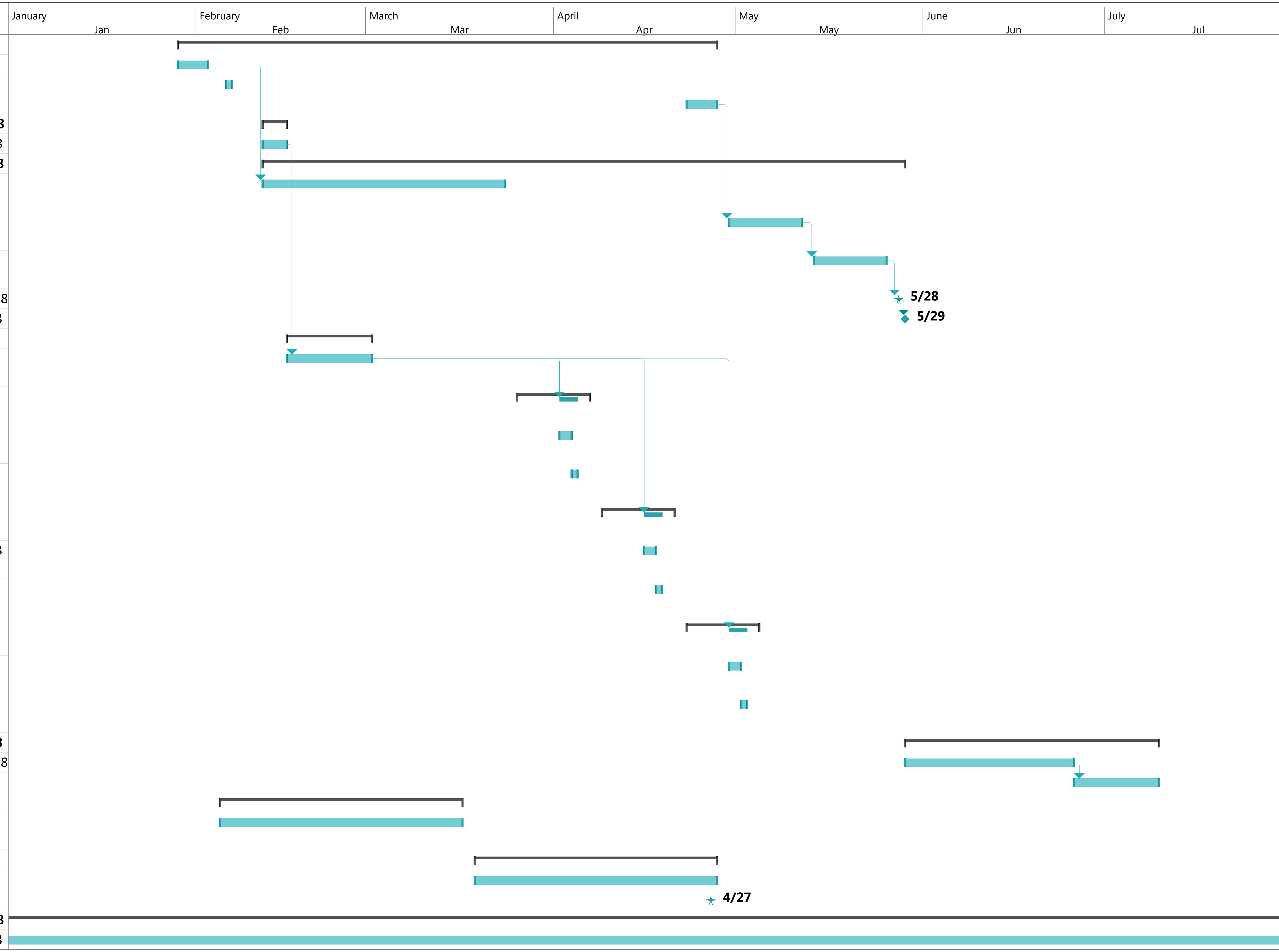
Subconsultant has a 5% mark-up

Expenses include sampling equipment and rentals (Jerome Meter, Tedlar Bags, Polyethylene Bottles, etc.), shipping, chemicals for jar testing, printing, and travel costs

Exhibit C - Project Schedule

Preliminary Schedule

ID	Task Name	Duration	Start	Finish
1	**Task 1**	**65 days**	**Mon 1/29/18**	**Fri 4/27/18**
2	Winter Sampling	5 days	Mon 1/29/18	Fri 2/2/18
3	Neighborhood Surve	1 day	Tue 2/6/18	Tue 2/6/18
4	Spring Sampling	5 days	Mon 4/23/18	Fri 4/27/18
5	**Task 2**	**4 days**	**Mon 2/12/18**	**Thu 2/15/18**
6	Jar Testing	4 days	Mon 2/12/18	Thu 2/15/18
7	**Task 3**	**76 days**	**Mon 2/12/18**	**Tue 5/29/18**
8	Baseline Model Development	30 days	Mon 2/12/18	Fri 3/23/18
9	Update Dispersion Model	10 days	Mon 4/30/18	Fri 5/11/18
10	Run Model Scenarios	10 days	Mon 5/14/18	Fri 5/25/18
11	Modeling Complete	0 days	Mon 5/28/18	Mon 5/28/18
12	Findings Workshop	0 days	Tue 5/29/18	Tue 5/29/18
13	**Task 4**	**10 days**	**Fri 2/16/18**	**Thu 3/1/18**
14	Prepare Implementation	10 days	Fri 2/16/18	Thu 3/1/18
15	**Conduct Mitigation Scheme 1**	**10 days**	**Mon 3/26/18**	**Fri 4/6/18**
16	Mitigation Scheme 1 Sampling	2 days	Mon 4/2/18	Tue 4/3/18
17	Mitigation Scheme 1 Survey	1 day	Wed 4/4/18	Wed 4/4/18
18	**Conduct Mitigation Scheme 2**	**10 days**	**Mon 4/9/18**	**Fri 4/20/18**
19	Mitigation Scheme 2 Sampling	2 days	Mon 4/16/18	Tue 4/17/18
20	Mitigation Scheme 2 Survey	1 day	Wed 4/18/18	Wed 4/18/18
21	**Conduct Mitigation Scheme 3**	**10 days**	**Mon 4/23/18**	**Fri 5/4/18**
22	Mitigation Scheme 3 Sampling	2 days	Mon 4/30/18	Tue 5/1/18
23	Mitigation Scheme 3 Survey	1 day	Wed 5/2/18	Wed 5/2/18
24	**Task 5**	**30 days**	**Tue 5/29/18**	**Mon 7/9/18**
25	Draft Report	20 days	Tue 5/29/18	Mon 6/25/18
26	Finzalie Report	10 days	Tue 6/26/18	Mon 7/9/18
27	**Task 6**	**30 days**	**Mon 2/5/18**	**Fri 3/16/18**
28	TAC Emissions Inventory & PS	30 days	Mon 2/5/18	Fri 3/16/18
29	**Task 7**	**30 days**	**Mon 3/19/18**	**Fri 4/27/18**
30	Develop Strategy	30 days	Mon 3/19/18	Fri 4/27/18
31	Deliver TM	0 days	Fri 4/27/18	Fri 4/27/18
32	**Task 8**	**152 days**	**Mon 1/1/18**	**Tue 7/31/18**
33	Project Managemen	152 days	Mon 1/1/18	Tue 7/31/18



Union Sanitation District - Task Order 2
December 4, 2017

Task | Meeting/Workshop | Milestone | Summary

UNION SANITARY DISTRICT

DATE: February 20, 2018

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Gene Boucher, Human Resources Manager
Karoline Terrazas, Training and Emergency Response Programs Manager

SUBJECT: Agenda Item No. 10 - Meeting of February 26, 2018
Consider a Resolution Designating Authorized Representatives for FEMA and State OES Disaster Assistance

Recommendation

Approve the attached Resolution, Designation of Authorized Representative for FEMA and State OES Disaster Assistance

Background

The Federal Emergency Management Agency (FEMA) administers the federal disaster assistance programs, and the State Office of Emergency Services (OES) administers state disaster assistance programs. All applicants applying for federal and/or state aid must submit paperwork related to disaster assistance to the OES. Every three years the District is asked by OES to complete and submit the Cal OES 130 "Designation of Applicant's Agent Resolution" that names the current authorized District representatives. This should be approved by the governing body in order to authorize signatures for the District. Funding will not be provided until Form 130 has been approved by the state and on file.

It is requested that the Board designate the General Manager, Collection Services Manager and the Technical Services Manager as authorized representatives to receive, process and coordinate all inquiries and requirements necessary to obtain available Federal Emergency Management Agency (FEMA) and Offices of Emergency Services (OES) disaster assistance. It is recommended that titles are used rather than names so that the form does not have to be re-submitted each time an authorized representative changes position or leaves the District. Along with the form sent to OES, a cover letter must be attached which lists the names of the current authorized representatives.

Attachments
Board Resolution
Cover Letter
OES Form 130 “Designation of Applicant’s Agent Resolution”

RESOLUTION NO. ______

RESOLUTION DESIGNATING AUTHORIZED REPRESENTATIVES FOR FEMA AND STATE OES DISASTER ASSISTANCE

WHEREAS, the Board of Directors of the UNION SANITARY DISTRICT, Alameda County, California, intends to designate authorized representatives for FEMA and the Governor's Office of Emergency Services Disaster Assistance;
and,

WHEREAS, the Board intends to be prepared to the best of its ability in the event of a disaster; and,

WHEREAS, the Office of Emergency Services requires the Grantee to certify by Designation of Applicant's Agent Resolution (OES Form 130), Union Sanitary District Agents, by title, to be passed and approved by the Board of Directors with a certified copy to the Governor's Office of Emergency Services.

NOW, THEREFORE, BE IT RESOLVED THAT: the General Manager, or the Collectio Services Manager, or the Facilities Maintenance Manager is hereby authorized to execute for and on behalf of the Union Sanitary District, a public entity established under the laws of the State of California, this application and to file it in the Governor's Office of Emergency Services for the purpose of obtaining certain federal assistance under P.L. 93-288 as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, and/or state financial assistance under the California Disaster Assistance Act;

AND, BE IT FURTHER RESOLVED THAT: the Union Sanitary District, a public entity established under the laws of the State of California, hereby authorizes its agent(s) to provide to the Governor's Office of Emergency Services for all matters pertaining to such state disaster assistance, the assurances and agreements required.

The foregoing Resolution was duly and regularly adopted as passed by the Board of Directors of the UNION SANITARY DISTRICT, Alameda County, California, at a meeting thereof held on the ___ day of ____________ ______.

February 26, 2018

Govenor's Office of Emergency Services
Grants Processing Unit (PA GPU)
3650 Schriever Ave.
Mather, CA 95655

Re: Cal OES Form 130

Dear Ms. Robin Shepard,

Union Sanitary District wishes to submit its Designation of Applicant's Agent Resolution, OES Form 130, with the State of California, Emergency Management Agency.

Attached is an original, certified copy of the resolution and form. Titles of agents authorized to execute for and in behalf of Union Sanitary District are indicated on the form. Listed below are the names of the employees currently holding these positions and therefore, authorized at this time to execute for and in behalf of Union Sanitary District.

General Manager/District Engineer	Paul R. Eldredge
Collection Systems Manager	James Schofield
Technical Services Manager	Sami Ghossain

Please contact me at (510) 477-7547 or karolinet@unionsanitary.ca.gov if you have any questions or require further information.

Sincerely,

Karoline Terrazas

Karoline Terrazas
Training and Emergency Response Programs Manager
Business Services
Union Sanitary District

Cal OES ID No: ______________________

DESIGNATION OF APPLICANT'S AGENT RESOLUTION FOR NON-STATE AGENCIES

BE IT RESOLVED BY THE ____________________________ OF THE ___________________________________
(Governing Body) (Name of Applicant)

THAT ____, OR
(Title of Authorized Agent)

____, OR
(Title of Authorized Agent)

____
(Title of Authorized Agent)

is hereby authorized to execute for and on behalf of the ____, a public entity
(Name of Applicant)
established under the laws of the State of California, this application and to file it with the California Governor's Office of Emergency Services for the purpose of obtaining certain federal financial assistance under Public Law 93-288 as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, and/or state financial assistance under the California Disaster Assistance Act.

THAT the ____, a public entity established under the laws of the State of California,
(Name of Applicant)
hereby authorizes its agent(s) to provide to the Governor's Office of Emergency Services for all matters pertaining to such state disaster assistance the assurances and agreements required.

Please check the appropriate box below:

☐ This is a universal resolution and is effective for all open and future disasters up to three (3) years following the date of approval below.
☐ This is a disaster specific resolution and is effective for only disaster number(s) _______________________

Passed and approved this ___________day of _________________, 20______

____
(Name and Title of Governing Body Representative)

____
(Name and Title of Governing Body Representative)

____
(Name and Title of Governing Body Representative)

CERTIFICATION

I, ____, duly appointed and __________________________________of
(Name) (Title)

____, do hereby certify that the above is a true and correct copy of a
(Name of Applicant)

Resolution passed and approved by the ____________________________of the ____________________________
(Governing Body) (Name of Applicant)

on the __________________day of ________________, 20___.

______________________________________ ______________________________________
(Signature) (Title)

Cal OES Form 130 Instructions

A Designation of Applicant's Agent Resolution for Non-State Agencies is required of all Applicants to be eligible to receive funding. A new resolution must be submitted if a previously submitted Resolution is older than three (3) years from the last date of approval, is invalid or has not been submitted.

When completing the Cal OES Form 130, Applicants should fill in the blanks on page 1. The blanks are to be filled in as follows:

Resolution Section:

Governing Body: This is the group responsible for appointing and approving the Authorized Agents.
Examples include: Board of Directors, City Council, Board of Supervisors, Board of Education, etc.

Name of Applicant: The public entity established under the laws of the State of California. Examples include: School District, Office of Education, City, County or Non-profit agency that has applied for the grant, such as: City of San Diego, Sacramento County, Burbank Unified School District, Napa County Office of Education, University Southern California.

Authorized Agent: These are the individuals that are authorized by the Governing Body to engage with the Federal Emergency Management Agency and the Governor's Office of Emergency Services regarding grants applied for by the Applicant. There are two ways of completing this section:

1. Titles Only: If the Governing Body so chooses, the titles of the Authorized Agents would be entered here, not their names. This allows the document to remain valid (for 3 years) if an Authorized Agent leaves the position and is replaced by another individual in the same title. If "Titles Only" is the chosen method, this document must be accompanied by a cover letter naming the Authorized Agents by name and title. This cover letter can be completed by any authorized person within the agency and does not require the Governing Body's signature.

2. Names and Titles: If the Governing Body so chooses, the names **and** titles of the Authorized Agents would be listed. A new Cal OES Form 130 will be required if any of the Authorized Agents are replaced, leave the position listed on the document or their title changes.

Governing Body Representative: These are the names and titles of the approving Board Members.
Examples include: Chairman of the Board, Director, Superintendent, etc. The names and titles **cannot** be one of the designated Authorized Agents, and a minimum of two or more approving board members need to be listed.

Certification Section:

Name and Title: This is the individual that was in attendance and recorded the Resolution creation and approval.
Examples include: City Clerk, Secretary to the Board of Directors, County Clerk, etc. This person **cannot** be one of the designated Authorized Agents or Approving Board Member (if a person holds two positions such as City Manager and Secretary to the Board and the City Manager is to be listed as an Authorized Agent, then the same person holding the Secretary position would sign the document as Secretary to the Board (not City Manager) to eliminate "Self Certification."

DATE: February 20, 2018

MEMO TO: Board of Directors - Union Sanitary District

FROM: Paul R. Eldredge, General Manager/District Engineer
Armando Lopez, Manager of Treatment and Disposal Services
Tim Grillo, R&S team Coach

SUBJECT: Agenda Item No. 11 - Meeting of February 26, 2018
Information Item: BAAQMD Regulation 11, Rule 18

Recommendation

Information only.

Background

The Bay Area Air Quality Management District (BAAQMD) adopted Regulation 11, Rule 18 (Rule 11-18) on November 15, 2017. The intent of the rule Is to protect the public health from toxic air pollution from existing facilities. The rule is applicable to facilities ranging in size from the large-scale plants like factories, oil refineries, and WWTPs to smaller operators like back-up generators and gas stations. The BAAQMD estimates that hundreds of facilities throughout the Bay Area will be subject to the new rule.

Rule 11-18 requires the air board to prioritize facilities and conduct a Health Risk Assessment (HRA) for high priority facilities. The HRA uses the facility's toxic air emission inventory and the distance from the pollution sources to the nearest residential and commercial locations to calculate the health risks due to toxic air contaminants. The Rule requires BAAQMD to prepare the HRA and allows a 30 days public comment period. If the HRA results are determined to exceed the Risk Action Level (RAL) established in the rule, the facility will be notified that they are subject to Rule 11-18 and have 180 days to submit a risk reduction plan that describes technically and economically feasible improvements to reduce the risk levels to below the RAL. BAAQMD will review and confirm whether the risk reduction plan will reduce the risk below the RAL. If accepted, the facility will have 5 years to implement the risk reduction plan, or up to 10 years if the facility can demonstrate an unreasonable economic burden or technical feasibility issues. If the risk reduction plan does not reduce the risk below the RAL, BAAQMD will work with facility to identify the best available retrofit control technology for toxics (TBARCT) for significant sources to further reduce risk and recommend addition to the risk reduction plan. BAAQMD will work with agencies on a case by case basis to achieve the lowest achievable risk if risk cannot be reduced below the RAL. The Rule requires annual progress reports until emissions reductions are achieved, and enforcement actions for non-compliance.

USD was selected by BAAQMD as one of 11 POTWs to collect additional data on existing emission points and demographic data for BAAQMD as part of a pilot study. Staff is working with BACWA and its associated agencies. BAAQMD has scheduled HRA for all POTWS to be prepared between calendar year 2019 and 2020.

The Rule represents a substantial change in the regulation of toxic air contaminants and could have potentially significant impact on Facilities that are subject to it. Staff is presenting this as an informational item only at this time. Additional information will be presented as we learn more about the process.

UNION SANITARY DISTRICT
CHECK REGISTER
02/03/2018-02/16/2018

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166889	2/16/2018	800444.10	MOUNTAIN CASCADE INC	FREMONT & PASEO PADRE LS IMPROVEMENTS	$359,834.37	$359,834.37
166891	2/16/2018	20171221.1	SWRCB - STATE WATER RESOURCES	SRF LOAN #C065221110 - SUBSTATION 1	$157,327.22	$157,327.22
166890	2/16/2018	20171221	SWRCB - STATE WATER RESOURCES	SRF LOAN #C065220110 - CEDAR BLVD	$127,349.06	$127,349.06
166810	2/8/2018	30104749	SYNAGRO WEST LLC	DECEMBER 2017 BIOSOLIDS DISPOSAL	$70,727.10	$70,727.10
166827	2/8/2018	217108	TANNER PACIFIC INC	PROJ: TWIN FORCE MAIN RELOCATION - PHASE 1	$61,962.50	$61,962.50
166870	2/15/2018	170120180205	PACIFIC GAS AND ELECTRIC	SERV TO 01/18/2018 PLANT	$58,048.46	$60,531.88
	2/15/2018	013720180202		SERV TO 02/01/18 BOYCE RD PS	$2,458.53	
	2/15/2018	140120180202		SERV TO 01/31/18 IRVINGTON PS	$24.89	
166880	2/15/2018	218011	TANNER PACIFIC INC	PROJ: WILLIAM LYON HOMES - TWIN FORCE MAIN RELOCATION	$55,650.50	$55,650.50
166786	2/8/2018	11308894	BROWN & CALDWELL CONSULTANTS	PRIMARY DIGESTER NO. 7	$24,979.30	$28,002.84
	2/8/2018	11308844		STANDBY POWER SYSTEM UPGRADE	$874.77	
	2/8/2018	11307847		EMERGENCY OUTFALL OUTLET IMPROVEMENTS	$2,148.77	
166883	2/15/2018	533620180122	US BANK CORP PAYMENT SYSTEM	MONTHLY CAL CARD STMT - JAN 2018	$21,643.75	$21,643.75
166818	2/8/2018	2653492C	DELTA DENTAL SERVICE	JANUARY 2018 DENTAL	$15,699.60	$17,877.13
	2/8/2018	2653492A		JANUARY 2018 DENTAL	$2,177.53	

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166882	2/15/2018	860374	UNIVAR USA INC	5001 GALS SODIUM HYPOCHLORITE	$2,453.41	$9,814.12
	2/15/2018	860787		5003 GALS SODIUM HYPOCHLORITE	$2,454.38	
	2/15/2018	861085		5000 GALS SODIUM HYPOCHLORITE	$2,452.92	
	2/15/2018	860193		5001 GALS SODIUM HYPOCHLORITE	$2,453.41	
166840	2/15/2018	32486	CALIFORNIA WATER TECHNOLOGIES	44,860 LBS FERROUS CHLORIDE	$4,631.55	$9,044.29
	2/15/2018	32303		41,720 LBS FERROUS CHLORIDE	$4,412.74	
166839	2/15/2018	6250	CAL SAN RISK MNGT AUTH	WC PAYROLL AUDIT 7/1/16 - 7/1/17	$7,993.00	$7,993.00
166822	2/8/2018	37432220180201	LINCOLN NATIONAL LIFE INS COMP	LIFE & DISABILITY INSURANCE - FEB 2018	$7,421.03	$7,421.03
166812	2/8/2018	858947	UNIVAR USA INC	4799 GALS SODIUM HYPOCHLORITE	$2,354.30	$7,161.52
	2/8/2018	858997		5000 GALS SODIUM HYPOCHLORITE	$2,452.92	
	2/8/2018	859583		4799 GALS SODIUM HYPOCHLORITE	$2,354.30	
166863	2/15/2018	4000879	JET-CARE INTERNATIONAL INC	50 EA COGEN OIL SAMPLE KITS	$3,011.22	$5,747.44
	2/15/2018	4000853		50 EA COGEN OIL SAMPLE KITS	$2,736.22	
166817	2/8/2018	8843	CASA BELLA HOMES LLC	REFUND # 20721	$2,500.00	$5,650.00
	2/8/2018	6970		REFUND # 20726	$3,150.00	
166785	2/8/2018	9335585526	BRADY WORLDWIDE, INC	LOCKOUT/TAGOUT LINK360 SETUP & ANNUAL CLOUD SUBSCRIPT	$5,348.66	$5,348.66

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Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166832	2/15/2018	4107361320180131	ALAMEDA COUNTY WATER DISTRICT	SERV TO: 01/31/2018-MTR HYD 16320037	$666.99	$5,289.76
	2/15/2018	4047286120180206		SERV TO: 02/02/18 - PASEO PADRE	$49.84	
	2/15/2018	4107393020180131		SERV TO: 01/31/18-MTR HYD 15141193	$666.99	
	2/15/2018	4107393120180131		SERV TO: 01/31/18-MTR HYD 16435270	$666.99	
	2/15/2018	4107393420180131		SERV TO: 01/31/18/-MTR HYD 15952331	$666.99	
	2/15/2018	4107393220180131		SERV TO: 01/31/18-MTR HYD 16435275	$666.99	
	2/15/2018	4107361120180131		SERV TO: 01/31/18-MTR HYD 15001101	$666.99	
	2/15/2018	4108253920180131		SERV TO: 01/31/18-MTR HYD 32896061	$570.99	
	2/15/2018	4107393520180131		SERV TO: 01/31/18-MTR HYD 16435269	$666.99	
166793	2/8/2018	17139	FEDSOURCE INC	MODULAR PARTITION WALL MATERIALS	$5,006.04	$5,006.04
166781	2/8/2018	10796521	AT&T	SERV: 12/13/17 - 01/12/18	$87.14	$4,660.46
	2/8/2018	10796520		SERV: 12/13/17 - 01/12/18	$65.71	
	2/8/2018	10815557		SERV: 12/20/17 - 01/19/18	$210.44	
	2/8/2018	10815533		SERV: 12/20/17 - 01/19/18	$15.56	
	2/8/2018	10815535		SERV: 12/20/17 - 01/19/18	$3,481.77	
	2/8/2018	10796519		SERV: 12/13/17 - 01/12/18	$42.72	
	2/8/2018	10796517		SERV: 12/13/17 - 01/12/18	$757.12	
166775	2/8/2018	170291	ADVANCED CHEMICAL TRANSPORT	HAZARDOUS MATERIAL MANAGEMENT	$4,607.28	$4,607.28
166787	2/8/2018	32465	CALIFORNIA WATER TECHNOLOGIES	41,720 LBS FERROUS CHLORIDE	$4,412.74	$4,412.74

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166862	2/15/2018	1055765	INDUSTRIAL SAFETY SUPPLY	2 CYL ASTD CAL GASES	$895.85	$4,339.83
	2/15/2018	1056354		BODY HARNESS	$3,281.85	
	2/15/2018	1055789		1 DZ GLOVES	$162.13	
166872	2/15/2018	1205381	POLYDYNE INC	43,380 LBS CLARIFLOC WE-539	$4,094.42	$4,094.42
166841	2/15/2018	7808	CARMAX AUTO SUPERSTORES	REFUND # 20647	$3,987.50	$3,987.50
166845	2/15/2018	50021827	CORELOGIC INFORMATION SOLUTION	METROSCAN ONLINE RENEWAL	$3,950.00	$3,950.00
166834	2/15/2018	8766	AU ENERGY LLC	REFUND # 20666	$3,917.50	$3,917.50
166871	2/15/2018	103935	PIIAN SYSTEMS LLC	6 5-GAL ODOR NEUTRALIZERS	$3,662.54	$3,662.54
166831	2/15/2018	180101685	AIRTECH MECHANICAL INC	SERVICE CALL: BLDG 77 REPLACED INDOOR PULLEY & DRIVE	$1,491.00	$3,652.75
	2/15/2018	180101683		SERVICE CALL: BLDG 68 REPLACED DEFROST CIRCUIT BOARD	$1,153.00	
	2/15/2018	180101734		JAN 2018: PREV MAINT BLDGS 53,63,67,68,74,76,77,78,79,80,81,90	$1,008.75	
166846	2/15/2018	17813001865	CORIX WATER PRODUCTS INC	15 MANHOLE FRAMES & COVERS	$3,621.76	$3,621.76
166854	2/15/2018	302217	CITY OF FREMONT	RANGE 2 HAZMAT STORAGE PERMIT	$327.96	$3,354.30
	2/15/2018	301550		RANGE 5 HAZMAT STORAGE PERMIT	$1,994.58	
	2/15/2018	301552		RANGE 2 HAZMAT STORAGE PERMIT	$327.96	
	2/15/2018	301551		RANGE 3 HAZMAT STORAGE PERMIT	$703.80	
166869	2/15/2018	8030	NEW LUK YUEN RESTAURANT	REFUND # 20746	$3,300.00	$3,300.00
166887	2/15/2018	9181	WELLS CONSTRUCTION INC	REFUND # 20756	$3,300.00	$3,300.00
166788	2/8/2018	18207316	CANON SOLUTIONS AMERICA INC	MONTHLY LEASE 6 CANON COLOR COPIERS	$3,154.15	$3,154.15

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166777	2/8/2018	180101674	AIRTECH MECHANICAL INC	SERVICE CALL: REPAIR CONDENSATE DRAIN BLDG 53	$945.00	$3,088.00
	2/8/2018	180101673		SERVICE CALL: REPLACE WORN DRIVE SHEAVES BLDG 78	$875.00	
	2/8/2018	180101684		SERVICE CALL: INSTALL NEW DUCT/RELOCATE TEMP SENSOR BL	$1,268.00	
166828	2/8/2018	20180201	VISION SERVICE PLAN - CA	FEBRUARY 2018 VISION STMT	$2,996.63	$2,996.63
166825	2/8/2018	916003324860	REPUBLIC SERVICES #916	RECYCLE & ROLL OFF - FEB 2018	$2,949.83	$2,949.83
166886	2/15/2018	8081164978	VWR INTERNATIONAL LLC	LAB SUPPLIES	$535.61	$2,547.05
	2/15/2018	8081091137		LAB SUPPLIES	$2,011.44	
166823	2/8/2018	9009	NEXGEN CONSTRUCITON CORP	REFUND # 20731	$2,500.00	$2,500.00
166873	2/15/2018	8298	PRO-PIPE SERVICES	REFUND # 20624	$2,500.00	$2,500.00
166826	2/8/2018	7388	STANDARD PACIFIC OF N CA, INC	REFUND # 20732	$2,450.00	$2,450.00
166858	2/15/2018	9661784158	GRAINGER INC	ASTD PARTS & MATERIALS	$104.48	$2,362.81
	2/15/2018	9661784141		ASTD PARTS & MATERIALS	$33.26	
	2/15/2018	9661363516		ASTD PARTS & MATERIALS	$49.89	
	2/15/2018	9662038208		ASTD PARTS & MATERIALS	$1,630.05	
	2/15/2018	9662038216		ASTD PARTS & MATERIALS	$12.44	
	2/15/2018	9665101011		ASTD PARTS & MATERIALS	$449.53	
	2/15/2018	9661363508		2 VALVES	$83.16	
166848	2/15/2018	20180125	DALE HARDWARE INC	01/18-ASTD PARTS & MATERIALS	$2,258.22	$2,258.22
166878	2/15/2018	8197	SUPPORT PRODUCT SERVICES INC	COGEN EMISSION ANALYZER I902143 SERVICE	$2,039.16	$2,039.16

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166803	2/8/2018	655102	MISSION CLAY PRODUCTS LLC	ASTD CLAY FITTINGS	$1,820.72	$1,820.72
166807	2/8/2018	25355	RMC WATER AND ENVIRONMENT	USD MODEL SUPPORT TO #3	$1,716.60	$1,716.60
166856	2/15/2018	20180207	MICHAEL GILL	EXP REIMB: WEB REPORTING SOFTWARE RENEWAL	$1,650.00	$1,650.00
166850	2/15/2018	8925	DRAINLINE SEWER SPECIALIST	REFUND # 20752	$500.00	$1,500.00
	2/15/2018	9385		REFUND # 20546 & 20547	$1,000.00	
166795	2/8/2018	9655382506	GRAINGER INC	ASTD PARTS & MATERIALS	$165.66	$1,401.46
	2/8/2018	9653506239		ASTD PARTS & MATERIALS	$3.09	
	2/8/2018	9658639639		ASTD PARTS & MATERIALS	$70.20	
	2/8/2018	9659217617		ASTD PARTS & MATERIALS	$789.05	
	2/8/2018	9655199389		ASTD PARTS & MATERIALS	$172.03	
	2/8/2018	9659305859		ASTD PARTS & MATERIALS	$164.43	
	2/8/2018	9654860478		ASTD PARTS & MATERIALS	$37.00	
166820	2/8/2018	8283	FLORIO DEVELOPMENT LLC	REFUND # 20730	$1,400.00	$1,400.00

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Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166802	2/8/2018	55169491	MCMASTER SUPPLY INC	ASTD PARTS & MATERIALS	$201.08	$1,397.70
	2/8/2018	55169489		ASTD PARTS & MATERIALS	$319.61	
	2/8/2018	55169488		ASTD PARTS & MATERIALS	$205.85	
	2/8/2018	55132501		ASTD PARTS & MATERIALS	$290.70	
	2/8/2018	55301496		ASTD PARTS & MATERIALS	$61.93	
	2/8/2018	55148019		ASTD PARTS & MATERIALS	$212.64	
	2/8/2018	55169490		ASTD PARTS & MATERIALS	$22.45	
	2/8/2018	55188046		ASTD PARTS & MATERIALS	$83.44	
166791	2/8/2018	1088968	ENTHALPY ANALYTICAL LLC	70 LAB SAMPLE ANALYSIS	$1,155.00	$1,315.00
	2/8/2018	1089266		16 LAB SAMPLE ANALYSIS	$160.00	
166805	2/8/2018	20180131	NAPA AUTO PARTS	MONTHLY AUTO PARTS STMT - JAN 2018	$1,227.75	$1,227.75
166842	2/15/2018	2288	CASS INFORMATION SYSTEMS	REFUND AR DUPLICATE PAYMENT	$1,208.86	$1,208.86
166821	2/8/2018	20180207	SAMI GHOSSAIN	TRAVEL REIMB: LODGING/AIRFARE/PER DIEM/PARKING-CASA 201	$1,183.33	$1,183.33
166838	2/15/2018	95193	BRUCE BARTON PUMP SERVICE INC	1 SUMP PUMP	$1,114.51	$1,114.51
166780	2/8/2018	618962	A-PRO PEST CONTROL INC	JANUARY PEST CONTROL	$1,005.00	$1,005.00
166877	2/15/2018	9497	STREAMLINE PLUMBING & DRAIN	REFUND # 20745	$500.00	$1,000.00
	2/15/2018	9498		REFUND # 20748	$500.00	
166847	2/15/2018	2833964	CUMMINS PACIFIC LLC	TROUBLESHOOT ENGINE 6 CATASTROPHIC FAILURE	$932.89	$932.89
166798	2/8/2018	1839	KEN GRADY CO INC	1 AMMONIA GAS MONITOR	$894.80	$894.80

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166824	2/8/2018	096020180130	PACIFIC GAS AND ELECTRIC	SERV TO 01/29/18 CATHODIC PROJECT	$53.43	$875.04
	2/8/2018	380420180130		SERV TO 01/29/18 CHERRY ST PS	$213.04	
	2/8/2018	666720180130		SERV TO 01/29/18 PASEO PADRE PS	$310.52	
	2/8/2018	898220180130		SERV TO 01/29/18 FREMONT PS	$239.19	
	2/8/2018	892820180130		SERV TO 01/29/18 HAYWARD MARSH	$58.86	
166792	2/8/2018	231863	ENVIRONMENTAL PRODUCTS & ACCES	VACTOR TRUCK PARTS	$874.68	$874.68
166797	2/8/2018	9715155	HF&H CONSULTANTS, LLC	FINANCIAL PLANNING MODEL	$810.00	$810.00
166888	2/15/2018	2034129	WEST YOST ASSOCIATES	HYPO TANKS AND PIPING REPLACEMENT	$800.50	$800.50
166811	2/8/2018	194966	TECHNICAL SAFETY SERVICES INC	FUME HOOD CERTIFICATION & ALARM CALIBRATION	$780.00	$780.00
166859	2/15/2018	3L8032	HARRINGTON INDUSTRIAL PLASTICS	ASTD PVC PARTS & MATERIALS	$247.29	$742.05
	2/15/2018	3L8033		ASTD PVC PARTS & MATERIALS	$37.00	
	2/15/2018	3L8035		ASTD PVC PARTS & MATERIALS	$132.01	
	2/15/2018	3L8036		ASTD PVC PARTS & MATERIALS	$222.02	
	2/15/2018	3L8034		ASTD PVC PARTS & MATERIALS	$103.73	
166868	2/15/2018	24027226	MOTION INDUSTRIES INC	6 AIR FILTERS	$492.01	$733.02
	2/15/2018	24027375		ASTD PARTS & MATERIALS	$170.89	
	2/15/2018	24027456		ASTD PARTS & MATERIALS	$70.12	

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166844	2/15/2018	54K105433	CINTAS CORPORATION NO. 2	UNIFORM LAUNDERING SERVICE	$405.35	$703.41
	2/15/2018	54K105434		UNIFORM LAUNDERING & RUGS	$280.84	
	2/15/2018	54K105435		ASTD DUST MOPS, WET MOPS & TERRY TOWEL	$17.22	
166789	2/8/2018	54K104585	CINTAS CORPORATION NO. 2	UNIFORM LAUNDERING & RUGS	$280.84	$698.06
	2/8/2018	54K104584		UNIFORM LAUNDERING SERVICE	$400.00	
	2/8/2018	54K104586		ASTD DUST MOPS, WET MOPS & TERRY TOWEL	$17.22	
166799	2/8/2018	20180201	RICHARD LEBON	TRAVEL REIMB: LODGING/PER DIEM/MILEAGE-CUES TRAINING	$695.85	$695.85
166813	2/8/2018	8081038840	VWR INTERNATIONAL LLC	LAB SUPPLIES	$419.18	$656.34
	2/8/2018	8081074704		LAB SUPPLIES	$74.21	
	2/8/2018	8081064500		LAB SUPPLIES	$35.49	
	2/8/2018	8081067778		LAB SUPPLIES	$127.46	
166864	2/15/2018	3028058	KELLY SERVICES INC	TEMP LABOR-GONZALEZ, E. WK END 01/21/2018	$648.72	$648.72
166851	2/15/2018	20180208	PAUL ELDREDGE	EXP REIMB: BOARDMEMBER LUNCHES/LODGING/PARKING/PER D	$628.58	$628.58
166790	2/8/2018	20180202	MANUEL DEL TORO	TRAVEL REIMB: LODGING/PER DIEM - CUES TRAINING	$617.34	$617.34
166852	2/15/2018	1089884	ENTHALPY ANALYTICAL LLC	11 LAB SAMPLE ANALYSIS	$320.00	$530.00
	2/15/2018	1090788		6 LAB SAMPLE ANALYSIS	$90.00	
	2/15/2018	1089885		4 LAB SAMPLE ANALYSIS	$120.00	
166804	2/8/2018	24026721	MOTION INDUSTRIES INC	ASTD PARTS & MATERIALS	$396.35	$522.54
	2/8/2018	24026568		ASTD PARTS & MATERIALS	$126.19	

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166800	2/8/2018	20180205	ARMANDO LOPEZ	TRAVEL REIMB: LODGING/PER DIEM/MILEAGE - 2018 CASA CONF	$500.78	$500.78
166829	2/8/2018	9470	CHRISTOPHER YOUNG	REFUND # 20728	$500.00	$500.00
166830	2/8/2018	9250	XIUHUI ZHENG	REFUND # 20727	$500.00	$500.00
166836	2/15/2018	9478	BENJAMIN FRANKLIN PLUMBING	REFUND # 20696	$500.00	$500.00
166853	2/15/2018	11712	CITY OF FOSTER CITY	2 JOB POSTINGS~	$500.00	$500.00
166860	2/15/2018	9408	HGA CONSTRUCTION INC	REFUND # 20747	$500.00	$500.00
166867	2/15/2018	9438	MONARCH PLUMBING & ROOTER INC	REFUND # 20749	$500.00	$500.00
166874	2/15/2018	9483	ROOTER HERO	REFUND # 20744	$500.00	$500.00
166881	2/15/2018	9439	TRENCHFREE, INC	REFUND # 20742	$500.00	$500.00
166794	2/8/2018	1841082042	GOODYEAR COMM TIRE & SERV CTRS	CREDIT INV 1841082016 - RECON POWDER COAT WHEEL	$-65.00	$445.23
	2/8/2018	1841082016		1 TIRE	$510.23	
166835	2/15/2018	20948500	BECK'S SHOES	SAFETY SHOES: E TATOLA	$208.00	$398.34
	2/15/2018	20948400		SAFETY SHOES: M GONZALEZ	$190.34	
166778	2/8/2018	278002584	ALFA LAVAL ASHBROOK SIMON-HART	100 WASHBOX SEALS	$391.02	$391.02
166849	2/15/2018	269128	DALE HARDWARE INC	ASTD PAINTING SUPPLIES	$375.75	$375.75

UNION SANITARY DISTRICT
CHECK REGISTER
02/03/2018-02/16/2018

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166837	2/15/2018	12417500	BLAISDELL'S	ASTD OFFICE SUPPLIES	$49.23	$371.69
	2/15/2018	12410930		ASTD OFFICE SUPPLIES	$58.53	
	2/15/2018	12412050		ASTD OFFICE SUPPLIES	$16.44	
	2/15/2018	12417501		1 DZ PENS	$3.06	
	2/15/2018	12420650		14 CHAIR ASSEMBLY FEES	$210.00	
	2/15/2018	12422600		ASTD OFFICE SUPPLIES	$34.43	
166796	2/8/2018	3L7560	HARRINGTON INDUSTRIAL PLASTICS	ASTD PVC PARTS & MATERIALS	$304.68	$337.61
	2/8/2018	3L7798		1-8" COUPLING	$32.93	
166782	2/8/2018	315314003	AUTO BODY TOOLMART	ASTD PARTS & MATERIALS	$129.35	$307.24
	2/8/2018	315314002		1 REPLACEMENT BULB / 4 AIRCRAFT REMOVER AEROSOL	$177.89	
166819	2/8/2018	381897	DLT SOLUTIONS, LLC	AWS CLOUD STORAGE - DECEMBER 2017	$305.26	$305.26
166866	2/15/2018	56087557	MCMASTER SUPPLY INC	ASTD PARTS & MATERIALS	$103.24	$286.82
	2/15/2018	55076116		ASTD PARTS & MATERIALS	$183.58	
166876	2/15/2018	20180131	SPOK INC	FEBRUARY 2018 PAGER SERVICE	$239.76	$239.76
166776	2/8/2018	9071940942	AIRGAS NCN	2 CYL WELDING GASES	$234.54	$234.54

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166784	2/8/2018	12406250	BLAISDELL'S	ASTD OFFICE SUPPLIES	$58.45	$219.39
	2/8/2018	12389402		1 BX AAA BATTERIES	$15.03	
	2/8/2018	12389401		ASTD OFFICE SUPPLIES	$7.20	
	2/8/2018	12393930		ASTD OFFICE SUPPLIES	$1.21	
	2/8/2018	12389400		ASTD OFFICE SUPPLIES	$43.79	
	2/8/2018	12392920		2 CHAIR ASSEMBLY FEES	$30.00	
	2/8/2018	12393790		ASTD OFFICE SUPPLIES	$63.71	
166884	2/15/2018	40863	VALLEY OIL COMPANY	1 DRUM DEF FLUID	$214.29	$214.29
166875	2/15/2018	8122768012518	SIERRA SPRING WATER COMPANY	BOTTLESS COOLERS RENTAL	$212.63	$212.63
166783	2/8/2018	20908000	BECK'S SHOES	SAFETY SHOES: R AGBUYA	$208.00	$208.00
166815	2/8/2018	4690	ZELAYA DESIGNS	PUBLIC OUTREACH	$204.00	$204.00
166814	2/8/2018	20180131	SHARON WEST	EXP REIMB: REG - APA WEBINAR	$195.00	$195.00
166885	2/15/2018	9800787077	VERIZON WIRELESS	WIRELESS SERV 01/02/18 - 02/01/18	$189.14	$189.14
166865	2/15/2018	20180208	SCOTT MARTIN	EXP REIMB: SAFETY BOOTS	$173.19	$173.19
166861	2/15/2018	944720180128	HOME DEPOT CREDIT SERVICES	MONTHLY HARDWARE STMT - JAN 2018	$164.15	$164.15
166809	2/8/2018	20180131	SWRCB - STATE WATER RESOURCES	GRADE V OPERATOR CERTIFICATE RENEWAL - J. BARTON	$150.00	$150.00
166857	2/15/2018	2773802211	GLACIER ICE COMPANY INC	96 7-LB BAGS OF ICE	$141.12	$141.12
166806	2/8/2018	340680	RKI INSTRUMENTS INC	1 BATTERY CASE	$131.70	$131.70
166855	2/15/2018	6700149413	G&K SERVICES CO	2 POLOS / 1 JACKET	$129.96	$129.96

Check No.	Date	Invoice No.	Vendor	Description	Invoice Amt	Check Amt
166833	2/15/2018	7012436550	APPLIED INDUSTRIAL TECHNOLOGIE	ASTD PARTS & MATERIALS	$115.11	$115.11
166816	2/8/2018	20180207	STATE OF CALIFORNIA	PE LICENSE RENEWAL - C. ELLIOTT	$115.00	$115.00
166801	2/8/2018	77879229	MATHESON TRI-GAS INC	MONTHLY CYLINDER RENTAL - DECEMBER 2017	$85.32	$85.32
166779	2/8/2018	7012381189	APPLIED INDUSTRIAL TECHNOLOGIE	ASTD PARTS & MATERIALS	$75.23	$75.23
166808	2/8/2018	1829569002	SAN LEANDRO ELECTRIC SUPPLY	ASTD ELECTRICAL SUPPLIES	$39.04	$39.04
166843	2/15/2018	301898	CENTERVILLE LOCKSMITH	4 PADLOCK KEYS	$8.56	$8.56

Invoices:

Credit Memos :	1	-65.00
$0 - $1,000 :	143	42,507.03
$1,000 - $10,000 :	57	160,474.87
$10,000 - $100,000 :	7	308,711.21
Over $100,000 :	3	644,510.65
Total:	211	1,156,138.76

Checks:

$0 - $1,000 :	58	25,108.69
$1,000 - $10,000 :	48	170,123.72
$10,000 - $100,000 :	7	316,395.70
Over $100,000 :	3	644,510.65
Total:	116	1,156,138.76

The Weather Channel

Posh Montana Ski Town Considers Using Treated Wastewater to Make Snow

By Pam Wright

February 6, 2018

A booming Montana ski town is considering the use of treated water to make snow in an attempt to offset a possible water shortage and to avoid discharging wastewater into the beloved Gallatin River.

Big Sky, in southwestern Montana, is home to some 2,300 full-time residents and scores of people who stay at posh vacation homes in one of the most exclusive ski resorts in the country.

Years ago, Big Sky was a sparsely populated enclave that was frequented by ski bums and fly-fishermen. According to News Deeply, the town about 50 miles from the west entrance to Yellowstone National Park saw a boom after the 1992 Robert Redford movie "A River Runs Through It," which created an interest in the scenic Gallatin River, used for some of the most iconic fly-fishing scenes in the film.

It is also home to one of the most exclusive gated ski and golf resorts in the nation, the Yellowstone Club. Ski lift tickets at the resort are not made available to the public, only to wealthy condominium and homeowners, who pay an average of $3 million and $25 million, respectively, for their vacation homes.

With the boom came significant problems, including a possible water crisis as groundwater reserves – the only source of the town's drinking water – become depleted. The town also struggles with wastewater treatment and what to do with the water once treated. A $15 million expansion of Big Sky's treatment center 15 years ago is already proving inadequate.

Solutions are necessary and desired as long as no one mentions the obvious: discharging the treated water back into the Gallatin. While that might be the simplest solution, there is a universal disdain for any thought of putting sewage into the beloved river.

Currently, the town uses the wastewater to irrigate golf courses in the summer, while in the winter, the wastewater is stored in ponds. Continued growth of the city means the ponds may soon become unsustainable, so a solution must be determined quickly.

"We need to find an alternative reuse method that releases wastewater in the winter," Kristin Gardner, executive director of the Gallatin River Task Force, told weather.com in an email. "In addition, this wastewater reuse method will help the ski resorts plan for anticipated future changes in snowfall with climate change. It's a win-win."

In response to the growing pains, the Gallatin River Task Force gathered a group of three dozen community leaders to create a forum known as the Big Sky Sustainable Water Solutions to explore possible fixes to the town's water issues.

One of the more popular suggestions is to use the treated wastewater for snow at the ski resorts. Proponents of the proposal see three positives: helping resorts as snowfall declines from climate change, discharging the wastewater responsibly and possibly replenishing the groundwater reserves during spring runoffs.

"Since Big Sky is located at the headwaters of the Gallatin and Madison rivers, we have no upstream sources of water," Gardner said. "Reusing wastewater, as snow will replenish aquifers, provides more opportunity for natural treatment and slowly releases water to our rivers when they need it most in the late season (summer/fall)."

According to the forum's report, there is community backing of the proposal despite the "potentially negative public perception to skiing on snow created from reclaimed water."

The report notes that this technique is being applied at other ski areas in the United States. Both of the town's biggest ski operators, Yellowstone Club and Big Sky Resort, are in favor of putting the plan in place by 2020.

Gardner noted that this method of wastewater reuse hasn't been done in Montana, so the state will need to determine the permitting guidelines.

"Locally, there will need to be infrastructure improvements to store and transport treated wastewater, agreements negotiated among the resort areas and the Big Sky Water and Sewer District, and a monitoring network developed to track any impacts to receiving waters," Gardner said.

Alameda County students graduate

Approximately 40 high school students served directly by the Alameda County Office of Education (ACOE) will soon don caps and gowns to participate in the annual Winter graduation activities.

Graduates of ACOE's Student Programs and Services division (SPaS) will be treated to a graduation luncheon, followed by a graduation ceremony in front of family, friends and supporters, on February 12 at the San Leandro Performing Arts Center.

ACOE is particularly proud to also offer senior portrait photo sessions as a complimentary service to students, as ordering photos can be cost-prohibitive to many. In addition to individual headshots, the students of the parenting teen programs can choose to be photographed with their children and family members.

"All high school graduates should be commended for their academic achievement, but our ACOE scholars are deserving of special recognition for their resilience and perseverance," said L. Karen Monroe, County Superintendent of Schools. "ACOE graduates are an inspiration to all of us who believe that great things can happen when you never give up."

Students served by SPaS are often the most vulnerable youth in the County, attending the program as a last chance at high school graduation. SPaS provides year-round alternative education programs for this diverse student population. With a current enrollment of more than 260 students from across Alameda County, ACOE SPaS operates a variety of programs.

In most cases, students are enrolled based on a referral from another institution. These programs provide academic instruction and support services to the county's most vulnerable students. For more information on participating in a program visit Student Programs and Services on the ACOE website (https://www.acoe.org/).

Spelling bee winners announced

Vivian Le, Anoushka Iyer, Lucy Tabish, Shrey Raju, Tanay Raote, Ghreyaa Gunasekar

SUBMITTED BY BRIAN KILLGORE

Fremont Unified School District recently crowned its top student spellers at its 2018 District Spelling Bee program held on Tuesday, Jan. 30 at Brookvale Elementary School. The top six finishers were:

• 1st Place: Vivian Le, Glenmoor Elementary, 5th grade.
• 2nd Place: Anoushka Iyer, Weibel Elementary, 6th grade
• 3rd Place: Lucy Tabish, Niles Elementary, 6th grade
• 4th Place: Shrey Raju, Mission Valley Elementary, 6th grade
• 5th Place: Tanay Raote, Green Elementary, 4th grade
•6th Place: Shreyaa Gunasekar, Warm Springs Elementary, 6th grade

Young Democrats group adopt Dreamers resolutions

SUBMITTED BY CRYSTAL ARAUJO

During their recent winter meeting in New York, the Young Democrats of America (YDA) came together to unanimously adopt resolutions in support of the DREAMers and to recognize Higher Education Student Debt as a crisis.

The two resolutions were drafted through the South Alameda County Young Democrats' (SACYD) recently established policy committees, and co-authored by East Bay Young Democrats (EBYD). "Now, if we could only get the majority of Congress to [do] its job!" said Igor Tregub, co-author and EBYD member.

The DREAMers' resolution passed on consent sending a strong and unified message that Young Democrats across the nation have come together in one voice to stand with the DREAMers and to demand the cancellation of deportation of young people and allow permanent residency status to all DACA recipients. The resolution states: "We cannot allow our neighbors and friends to live in fear of the administration. We must continue to demonstrate that we are stronger together and echo the California Democratic Party that also supports Dreamers."

The resolution on the Higher Education Student Debt Crisis passed with the same urgency as the debt recently reached \$1.36 trillion. YDA recognized, "student loan debt as an economic crisis mainly affecting young people pursuing higher education to become contributing members of society and acknowledge that both current and future students should be afforded every opportunity to obtain an education without the burden of crippling debt."

Crystal Araujo and Kathryn Larrowe, SACYD board members and authors of the resolutions, invite California Young Democrats (CYD) leaders across the state to join efforts to introducing California versions of these resolutions at the CYD board meeting at the California Democratic Party State Convention in San Diego, set for Feb. 23 – 25.

To learn more about South Alameda County Young Democrats, look for their links on Facebook, Twitter, and Instagram @SouthACYD.

USD UNION SANITARY DISTRICT

Union Sanitary District Centennial Stories

BY MICHELLE POWELL

Union Sanitary District (USD) is celebrating one hundred years of service to the Tri-Cities in 2018 with a look back at our history, a look forward to the future, and an Open House event in May to share some family-friendly fun with our customers.

USD is proud of its century of providing wastewater collection, treatment, and disposal services to the Tri-Cities, and we'll share historical highlights and fun facts in this newspaper during the coming months. In our founding year of 1918, USD's boundaries encompassed 3,300 acres in what was known as Southern Alameda County. The area was primarily farm and ranchland well into the twentieth century, and septic tanks were typically used for wastewater disposal.

Today, USD's service area covers over 60 square miles (about 38,400 acres), and serves over 350,000 residents in the cities of Fremont, Newark, and Union City, with over 113,000 residential, commercial, and industrial connections. Total flow to our Alvarado Treatment Plant in Union City was over 8.5 billion gallons in 2017, and averages between 22 and 24 million gallons every day.

Here's a preview of just a few of the subjects we'll explore in future issues:

• USD's early years, highlighting how several local sewer districts became part of Union Sanitary District

• The transformation of smaller Tri-City treatment plants into pump stations that direct flow to our centralized plant in Union City, and the plant's expansions and upgrades to meet the needs of our growing communities

• The Federal Clean Water Act as a catalyst for USD's partnership with nearby agencies to build a "Super Sewer" common transport line for a regional approach to protection of water quality in the San Francisco Bay

• Today's challenges in wastewater collection and treatment, and how residents can protect their sewer laterals and public infrastructure

• Preparing for the future: USD's master planning efforts to develop a roadmap for our next 20 to 40 years of service

"We're honored to be an integral part of the history and daily life of the Tri-Cities," says General Manager Paul Eldredge. "It's a rare privilege for a utility to serve customers for 100 years."

USD's Centennial Open House will be the highlight of its commemorative year on Saturday, May 19, from 10:00 a.m. to 2:00 p.m. A previous event held in 2015 was a smash-hit with the community – over 1,100 attendees enjoyed touring the plant, viewing displays and interactive demonstrations, and chatting with District staff. "We're busy planning even more fun ways for kids and adults to learn about USD's protection of public health and the environment during the Centennial event," says Eldredge. "Our dedicated, highly-trained staff enjoys showcasing the complexities of maintaining over 819 miles of sewer lines and operating a 33-acre wastewater treatment plant. This is a very special birthday for us, and we're excited to celebrate it with our customers."

Have questions or information to share about USD's history Contact us at (510) 477-7500 or visit usd@unionsanitary.ca.gov

Plant today

Plant in 1964

The Washington Post

A nasty ‘fatberg,’ a lump of grease, wet wipes and condoms, is now being displayed at the Museum of London

By Karla Adam
February 9

Pieces of fatberg, a congealed lump of fat, sanitary napkins, wet wipes, condoms, diapers and similar items found in London's sewer system, is on display at the Museum of London. (Daniel Leal-Olivas/AFP/Getty Images)

LONDON — The Mona Lisa it is not.

But the new “Fatberg!” exhibition in central London is nonetheless drawing attention for its own special reasons. The latest attraction at the Museum of London is rocklike, repugnant and revolting. It also has tiny bugs living on it.

Chunks from the 143-ton fatberg found in London’s aging sewer system went on display at the Museum of London Friday, retelling the story of how sewer workers tackled a massive blob of waste — using jet hoses, pickaxes, spades and shovels.

The giant blob, discovered last September in the Whitechapel area of east London, garnered international attention. It took nine weeks to dismantle the congealed clump of grease, wet wipes, condoms and other icky items.

It may have been compelling, in a I-don’t-want-to-look-but-can’t-help-it sorta way, but the sight of the advancing detritus clogging up the sewers wasn’t pretty.

A sewage worker uniform is displayed at the exhibition. (Daniel Leal-Olivas/AFP/Getty Images)

Not that it stopped the Museum of London from wanting to get their (gloved) hands on a few samples.

“A fatberg has long been on the Museum of London wishlist. We want to reflect the highs and lows of city living,” said curator Vyki Sparkes.

Fatbergs are “gross, but strangely compelling,” she added.

They are also a major problem in the British capital, which has a Victorian sewer system that has struggled to cope as the city’s population has increased. The British utility company Thames Water spends about 1 million pounds ($1.4 million) a month fighting the fatbergs that are lurking in the pipes and tunnels beneath the people’s feet, many located in areas of London with restaurants that pour cooking oil down the drain. If fatbergs aren’t removed, they can cause sewer overflows.

It’s not just a London problem, of course. Last fall, a 20-foot fatberg was dislodged from the sewers in Baltimore.

But London may be the first city to encase samples of sewage in perspex viewing boxes and then invite people round to check it out.

Sparkes says that part of the reason fatbergs have captured the public imagination is down to the name, for which we can thank London sewer workers. They coined the term “fatberg,” which entered the Oxford English Dictionary in 2015.

“People can really visualize that it’s like a giant iceberg but made of fat,” Sparkes said.

It’s not all doom and gloom. The display reveals that some of the fatberg was converted into biodiesel that helps to run London buses.

What is a #fatberg made of and how do you conserve it for display? Find out in this film: https://t.co/uwOnQwSWLg Got through that?
Fatberg! will be on display at Museum of London 9 February - 1 July 2018.

— Museum of London (@MuseumofLondon) February 9, 2018

The samples on display, which were air-dried, look like clumps of moonscape or a small asteroid. But lean in and you'll see a tiny piece of a Double Decker chocolate bar wrapper poking out of one grayish blob. Lean in even closer and you'll see the small flies that hatched when the samples were in quarantine.

“You can see flies walking along and crawling — it's like it has its own pets,” said Sparkes, who added that “this is almost like a live experiment.” She says she doesn't know what the exhibition will look like at the end of its run in July. “It's attracting flies, it's changing. It definitely looks a lot different from when we got it a few months ago. The sample that air dried faster has crumbled into parts.”

Thames Water, the utility company, says it hopes the display will spark a larger conversation about what gets flushed down the drain — particularly things that cause headaches like wet wipes, condoms and sanitary pads.

“We'd like people to realize what they are flushing down the toilet, or pouring down the sink can have an effect. Just because it's out of sight doesn't mean it's gone forever,” said Lee Irving, a Thames Water spokesman.

“We are down in the sewers tackling fatbergs every single day,” he said.

The Mercury News

California's drought restrictions on wasteful water habits could be coming back — this time they'll be permanent

By Steve Scauzillo | Southern California News Group
PUBLISHED: February 13, 2018

Anyone caught wasting water in California may be fined as much as $500 under new rules being considered by the state water board, officials said Monday.

The State Water Resources Control Board is expected to adopt regulation coming before the board on Feb. 20 that would make it a crime to commit any of seven wasteful water practices — from lawn over watering to street median irrigation. Those rules would take effect April 1.

"These are permanent prohibitions on wasteful water uses," said Max Gomberg, a climate and conservation manager for the state board. The ruling would formally make the rules part of the state code.

This means the powerful agency would no longer need a "drought emergency" declaration from the governor to act, like the ones issued by Gov. Jerry Brown during the state drought between 2012 and 2017.

Acting on Brown's orders, the board in July 2014 adopted mandatory monthly conservation requirements for every city and urban retail water agency in the state. The rules took effect in May 2015

Those that routinely missed the mark were sent warnings or were fined. A ban on wasteful water practices also was included. The result of the orders was an almost 25 percent drop in water use statewide.

But plentiful rain and snow fell mostly in Northern California in the winter of 2016-2017, filling reservoirs to overflowing and piling up the snow pack in the Sierra, key sources of more than 30 percent of Southern California's water supply.

Brown declared the drought over in April last year. The regulations — including laws against wasteful water practices — expired on Nov. 25.

The new rules would outlaw, in perpetuity, the following practices:

- Over watering lawns in which water flows into the street
- Washing down driveways and sidewalks
- Washing your car using a hose without an automatic shutoff nozzle
- Running an ornamental fountain without a recirculating system
- Watering lawns and landscapes within 48 hours of one-fourth of an inch or more of rainfall
- Hotels not asking guests to skip laundering of towels and linens daily
- Watering a street median that has no community recreational or civic function. Cities and counties would have until Jan. 1, 2025 to comply.

“This is one step in making conservation a way of life in California,” Gomberg said.

He said the state would rely on residents to rat out water wasters for enforcement. One way to do so is to fill out a complaint form with the address of the potential violator by going to www.savewater.ca.gov.

No one would be above the law, Gomberg said — as proposed, the regulation applies to residents, businesses and government, including state governmental entities such as Caltrans.

The agency will investigate each allegation of misuse when the complainant shows “good cause” or the board believes a misuse has taken place, according to the regulation.

The water board will send a fix-it letter, and if the violator complies, the issue is resolved. But if the inspector deems the business or residence to be repeat offender, a fine of up to $500 per day would be issued along with a cease and desist order.

If the user continues to waste water, the state can rescind the holder’s water permit or license. If the violator ignores the order, the state board can ask the state attorney general’s office to take action.

Gomberg said the agency’s current enforcement staff can handle the complaints. “I do expect an uptick but we can do it without hiring new people.”

Ending grass medians in the state by 2025 will be among the biggest changes enacted in the new regulations, Gomberg said. Unless a city or county can prove the irrigation is necessary for a community purpose, or that the median is irrigated using reclaimed water, the grass there will either have to go brown or be replaced by rocks or woodchips.

While trees can be planted in medians, they must be more climate-compliant trees. These can and should be watered, he said.

If pending legislation passes that gives cities and counties the authority to issue fines for water wasting, then the state’s enforcement role will be diminished, Gomberg said. But such legislation would take effect on Jan. 1, 2019 at the earliest.

In an email, Joseph Ramallo, a spokesman for the Los Angeles Department of Water and Power, said the agency supported the water board's expected actions and saw regulation "as a part of making water conservation a California way of life."

"It is just good common sense not to allow the water to run off the sidewalk and to fix your broken sprinklers," said Dan Arrighi, water resources manager for San Gabriel Valley Water Co., one of the largest water retailers in the state.

Though a rainy winter filled reservoirs, the ground water levels in Southern California are still at record low levels, Arrighi said.

Many cities in Los Angeles, San Bernardino and Orange counties get their water from the ground. It will take years of replenishing with water piped in from Northern California to return the aquifers to safe levels, he said.

"Even if a March miracle does come and we get rain, we are still not out of the woods," he said.

Napa Valley Register

Napa San to do $4.7 million in sewer line repairs

BARRY EBERLING beberling@napanews.com

Napa County Reporter

February 15, 2018

A sign warns visitors of the presence of contaminated water at Lake Park near Stonehouse Drive. On February 9, 2017, 25,000 gallons of sewage flowed into the park that held 5 million gallons of stormwater. Sewer line upgrades this year are to help prevent future episodes.

Napa Sanitation District will spend $4.7 million this spring and summer on its continuing effort to repair aging sewer lines, this time focusing on a Napa area that last year experienced a sewage spill.

The idea is to keep underground water out of the pipes and sewage in. Water seeping through cracks in aging pipes during big storms can swamp the sewer system and cause it to overflow onto streets.

That happened on Feb. 9, 2017. Sewage-tainted water spilled into the city of Napa's Lake Park near Stonehouse Drive north of Lincoln Avenue.

Napa San last week awarded a contract for its annual sewer line rehabilitation projects. Workers will strengthen 6.1 miles of line.

"By doing these projects, we're going to reduce the amount of water that gets into the system upstream of Lake Park," Napa San General Manager Tim Healy said.

Targeted work locations include the Pear Tree Lane area, the area near Trower Avenue and Wise Drive and sites on the west side of Highway 29, such as the area near Linda Vista Avenue and Renfrew Street.

Plus, the district will do projects in other parts of the city where lines are not upstream from Lake Park. These sites include the Northwood subdivision and an area south of Redwood Road in northern Napa, Rose Lane in central Napa and South Jefferson Street in southern Napa.

Residents in these neighborhoods need not worry about big inconveniences, Healy said. For the most part, workers will simply pull liners into the existing pipes by using manholes.

"We're healing the pipe from the inside without doing any excavation," Healy said.

That includes rehabilitating a pipe that goes underneath Highway 29 near El Centro Avenue.

"We don't have to dig up the highway," Healy said. "We don't have to worry about traffic. You go manhole to manhole underneath that highway."

Work on the projects is to begin in March and be completed by November.

Rains in February 2017 were so heavy that the Napa San wastewater treatment plant handled up to 55 million gallons on some days, compared to six gallons during a typical dry day. Since storm drains don't connect to the sewer, the extra water cannot be attributed to water runoff from streets.

Napa San has a goal of replacing 2 percent of its 270 miles of pipes annually, or the whole system over 50 years, at which point the replacements could start all over again. This year’s 6.1 miles worth of projects will replace 2.2 percent of the system.

Healy said sewer pipes installed during the 1960s were supposed to last 100 years, but are having problems at 50 years. Hopefully, the liners being added to the sewer pipes at various locations this year last longer than 50 years, he added.

Napa San received two bids for this year’s sewer rehabilitation projects. It awarded the contract to Southwest Pipeline and Trenchless Corp. for $4.7 million. The other bid submitted by Michels Corp. was 69 percent higher at $7.9 million.

The district serves about 20 square miles in the city of Napa, Silverado Country Club, the Napa County airport area and several adjacent, unincorporated areas.

SFGATE

Why meteorologists say even a 'Miracle March' can't save California's dismally dry winter

By Amy Graff, SFGATE

February 16, 2018

Amid a winter marked by more sun than storms, California is desperate for rain and snow.

An end-of-winter burst of wet potent California storms, aka a Miracle March, is the only hope to bolster the Sierra Nevada snowpack and boost the rainfall totals, but meteorologists say the odds of this happening are almost none.

Even if a few wet weather systems sweep across the state in March, they're unlikely to bump the state up to normal precipitation totals for the season.

"Once we get into late February, we'll begin to have a better look at how the global patterns are setting up for March and then we'll be able to talk a little more clearly about probability," says Brian Garcia, a meteorologist with the National Weather Service in Monterey. "Historically and statistically, it's not looking great. For example, S.F. has about a 3.8 percent chance of reaching 'normal' or greater by the end of the water year." UCLA climate scientist Daniel Swain concurs: "A 'miracle March' of course, is always possible--if we get lucky. Indeed, it has happened before. But the odds are long, and even a very wet March would be unlikely to erase the very large snowpack deficits that exist statewide and the equally deep rainfall deficits across Southern California."

Swain is referring to 1991 when the state was parched and dry from five years of drought, and January and February saw few weak storms. And then on the final day of February, a fierce storm blasted the state and led the way into a full month of soggy weather.

Recalling the record-breaking event, David Rizzardo, the chief of snow surveys at the California Department of Water Resources, says at the end of February 1991, the snow water content in the Northern Sierra was six inches—that's 19 inches from the benchmark level of 29 inches on April 1, when the snowpack usually begins to melt.

"Then all of a sudden March dropped 15 inches of snow water equivalent," Rizzardo says. "An average March is 3.5 inches of snow water content. It was an extremely big boost."

By comparison, the snow water content in the Northern Sierra currently stands at 4.9 inches. If a Miracle March moved the region up another 15 inches, we'd still be a long way from reaching what's considered normal.

"That Miracle March was 15 inches and we're trying to add 24 inches to get to normal," Rizzardo says. "It's extremely unlikely."

A high-pressure ridge has remained parked along the West Coast for most of the 2017-18 winter, acting like an invisible wall and blocking moisture-rich storms in the Pacific Ocean from reaching land.

In February, many areas of the state haven't seen a single drop of rain and the Sierra has only received light dustings of snow, and climate models don't show any major storms in the next two weeks.

With no storms, rainfall totals are dismally low around the state, and especially in Southern California. Los Angeles will have seen only one significant day of rainfall (over .33 inches) in a full calendar year if the city reaches Feb. 19 without any rain.

"It has been an exceptionally dry season so far across Southern California--even more so than across Northern California," Swain says. "Even more remarkable is the concentration of what little has rain has fallen during the entire season in this part of the state into a single storm event in early January--the one which led to the devastating Montecito debris flow downstream of the Thomas Fire burn scar."

The north has seen more rainy says than the south, but totals are still unseasonably low. As of Feb. 15, Downtown San Francisco has recorded 8.53 inches, compared to 16 inches that's normal for this same date.

A typical rainfall season in Downtown San Francisco running July 1 to June 30 sees 23.65 inches of rain, and Null is certain we're not going to reach this point even if March is wet.

"We would need 15.12 inches in a Miracle March and a Miracle April," Null says. "It has never happened."

Null looked at all the years going back to 1849 that San Francisco saw less than 10 inches of rain between July 1 and Feb. 28, and identified 27. Of those, none ended with a seasonal total that got close 23.65 inches.

"The highest we've ever seen is 16.87 inches," Null says. "That still leaves us on the order of 7 inches below."

There's no indication that we'll even approach miracle level rainfall totals anytime soon. New projections released Thursday by the Climate Prediction Center indicate California is likely to continue to be much drier than normal over the coming weeks.

Fort Ord: Recycled water pipeline project set to break ground with ceremony

By Jim Johnson, Monterey Herald

Posted: 02/19/18

Marina >> In the works for more than a decade, a recycled water pipeline and distribution system to supply the Ord Community and the Seaside basin will formally mark the beginning of construction this week.

On Tuesday, Marina Coast Water District and Monterey One Water officials will hold an official groundbreaking for the $22.6 million project, which is set to add 8 miles of 24-inch pipeline from north of Marina to Seaside where it will connect with two more miles of existing pipe along Gen. Jim Moore Boulevard.

The pipeline is designed to deliver advanced treated water from the Pure Water Monterey plant to development on the former military base served by Marina Coast and for injection into the Seaside basin and later use on the Monterey Peninsula under a multi-party agreement. The project also includes a 2 million-gallon water tank known as the Blackhorse recycled water reservoir for golf course irrigation, as well as a series of distribution pipes.

Marina Coast board Vice President Jan Shriner said she was “pleased to see (the water district) working with other agencies on a much-needed water project.”

Monterey One Water general manager Paul Sciuto called the pipeline a “critical component” of the Pure Water Monterey project, and noted that an agreement with Marina Coast had “streamlined the overall project and created efficiencies for both agencies and (their) customers.”

The work is funded by low-interest state loans and grants, as well as about $6 million in Fort Ord Reuse Authority fees.

The groundbreaking ceremony is set for 10:30 a.m. at 3300 Crescent Avenue in Marina. It will include comments and a ceremonial signing of the pipe and breaking ground with shovels.

Originally approved in 2006, the pipeline is part of the Regional Urban Water Augmentation Project aimed at providing 2,400 acre feet of recycled water to the Ord Community for irrigation use instead of groundwater, and is also being used by Pure Water Monterey under an agreement aimed at avoiding infrastructure duplication.

The first phase of the project will provide 600 acre feet of recycled water to the Ord Community, and a subsequent phase is expected to add another 847 acre feet, with the remaining amount still to be analyzed.

In all, the project will cost $35 million, including about $12 million for the distribution system. Monterey One Water will contribute about $7 million to the project cost.

Construction on the pipeline is due to be finished by March next year, according to Marina Coast general manager Keith Van Der Maaten, followed by the distribution system a year later.

“This project is another step forward in our commitment to provide new water supply sources for customers and the region,” Van Der Maaten said. “We are constantly evaluating and developing new ways to preserve and protect our water supply, develop new sources for the future through a collaborative approach to problem solving.”

Meanwhile, the Marina Coast board is poised to consider on Tuesday night an annexation proposal for adding the Ord Community into the district, which already provides water service to the area.

Jim Johnson can be reached at 831-726-4348.

RESOLUTION NO. ______
RESOLUTION DESIGNATING AUTHORIZED REPRESENTATIVES FOR FEMA AND STATE OES DISASTER ASSISTANCE

WHEREAS, the Board of Directors of the UNION SANITARY DISTRICT, Alameda County, California, intends to designate authorized representatives for FEMA and the Governor's Office of Emergency Services Disaster Assistance;
and,

WHEREAS, the Board intends to be prepared to the best of its ability in the event of a disaster; and,

WHEREAS, the Office of Emergency Services requires the Grantee to certify by Designation of Applicant's Agent Resolution (OES Form 130), Union Sanitary District Agents, by title, to be passed and approved by the Board of Directors with a certified copy to the Governor's Office of Emergency Services.

NOW, THEREFORE, BE IT RESOLVED THAT: the General Manager, or the Collection Services Manager, or the ~~Facilities Maintenance~~Technical Services Manager is hereby authorized to execute for and on behalf of the Union Sanitary District, a public entity established under the laws of the State of California, this application and to file it in the Governor's Office of Emergency Services for the purpose of obtaining certain federal assistance under P.L. 93-288 as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, and/or state financial assistance under the California Disaster Assistance Act;

AND, BE IT FURTHER RESOLVED THAT: the Union Sanitary District, a public entity established under the laws of the State of California, hereby authorizes its agent(s) to provide to the Governor's Office of Emergency Services for all matters pertaining to such state disaster assistance, the assurances and agreements required.

The foregoing Resolution was duly and regularly adopted as passed by the Board of Directors of the UNION SANITARY DISTRICT, Alameda County, California, at a meeting thereof held on the____day of____________________.

Desk Item
Item 10
2/26/2018