

Proposed Water Quality Lab Upgrades

Engineering and Operations Committee Item 6c January 10, 2022

Outline

Water Quality Background

Project Drivers

Rigorous Project PlanningRecommended Approach



Water Quality Lab – An Essential Facility

- Compliance monitoring and testing
 - Bacteria, disinfection byproducts
 - Metals and minerals, organic chemicals
- General water quality monitoring
 - PH, temperature, turbidity, alkalinity
- Distribution system integrity
 - Shutdowns and repairs/maintenance
 - Nitrification monitoring (nitrite, ammonia)
- Customer satisfaction
 - TDS, taste & odor, color
- Applied research
 - Emerging contaminants, treatment processes, analytical methods, alternative source waters





Essential Monitoring and Analysis

Routine analysis

- ~70,000 samples/year
- 266 analytical procedures
- 300,000 350,000 analytical results per year
- Samples from Metropolitan's entire system
 - Treated water distribution system
 - Treatment plants
 - Lakes and other source waters
 - Pipelines, facility shutdowns, and repairs
- 102 staff
 - Chemists, Microbiologists, Limnologists, Engineers, Biologists, Lab Technicians, Quality Assurance, Data Management, Business Support
- \$30M annual budget

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Innovation & Leadership in Water Quality

Nitrification Ozone disinfection Treatment processes Cryptosporidium Nitrosamines Disinfection byproducts Flavor Profile Analysis Cyanotoxins Water reuse

De	Leon et	al.	[45
(54)	CRYPTO	SPORIDIUM DETECTION METHOD	Chrisp
[75]	Inventors	Ricardo De Leon, Irvine: Paul A. Rochelle, Manhattan Beach, both of Calif.	polym (1994) DuPor
[73]	Assignee:	Metropolitan Water District of Southern California, Los Angelos, Calif.	Crypto Englist Faveni
[21]	Appl. No.	647,351	J., Rai cation
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[51]	Int. CL*	C12Q 1/68	Filkon
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58	Field of S	earch 435/34, 205, 7, 91, 91.2; 536/24.3	Gooze gone fi
[56]		References Citod	Gupta
	U.	5. PATENT DOCUMENTS	HSP 7
	Loki,195 1 Loki,202 1 Loki,202 1	(1987) Mullis et al. 435.6 (1987) Mullis et al. 435.91.2 (1987) Mullis et al. 435.6	Sci. U. Johnse Room

Peer Reviewed Expanded Summary

Analysis of Microcystins in Drinking Water by ELISA and LC/MS/MS

INDRO C. DUD. ANTHEA K. LEE. RICHARD E. MITER, BUN LIAMS, AND PAUL A. RODHELLE Impaction data angle 1.74 Chineses 2016, 100 (42)

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recontrations using the lot provided MCDR standards Figure 11. The memory inflated MCLA concentration was more pronounced at higher spike concruttations ELEA measured MCLA concentrations were cleare to and for calibration 1/ AOMS detects individual contents in long is visedards are similable and provides the specfighty needed to inform operational decisions. However, LOMSINS results can be solvert to matrix effects, a sponogriate analysis manual measures must be incorporated to brack-scale studey, consusted microcrystry amounted low-level postne corporate by ELISA and a person phase photographic states and the states of the states and the states an ditacted by ICMSMS. In light of the law merscysta holds advance concentration of \$1.3 pg/L for children moler age tits, ELISA results-particularly in treated possibility of false positive results, relatively high variability and differential detection of some variants

Complexities on her Timbo C. Carto a team reasons in the Water Quality Laboratory at the Metropolitan Water District of Southern California, 700 Blorens Are,

Water Quality's Expanded Functions

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Water Quality Challenges

New and Revised Regulations

- New lab accreditation
- Revised Total Coliform Rule
- Revised Microbial/DBP Rules

New and Emerging Contaminants

- 1,2,3-TCP
- PFAS, Microplastics
- Pharmaceuticals
- New disinfection byproducts

Low Flow in Distribution System

- Nitrification
- Coliform regrowth
- Corrosion control

Lakes and Source Waters

- Taste and odor
- Cyanotoxins
- Stratification and anoxia
- Invasive quagga mussels

Recycled Water Program

- Detecting and removing contaminants
- Blending strategies
- Direct potable reuse

Current Building Limitations

- Spaces fully utilized or beyond capacity
 Lab spaces open to common areas
 Overlap between office and lab spaces
- Staff cubicles in corridors
- Under-utilized and inefficient spaces
- Inadequate record storage

Laboratory No Longer Meets Requirements

- Laboratory requirements
 - Maintain regulatory compliance
 - Emerging issues and contaminants
- Need dedicated spaces and equipment for reuse, PFAS, and microplastics, etc.
 - Clean rooms, pathogen containment, specialized instruments
- Workflow improvements within the building
 - Redesign lab spaces to accommodate expanded functions
 - Need better separation between lab and office areas
 - Improved records and document storage
- Metropolitan needs a state-of-the-art facility that meets all current and future requirements

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Seismic Resiliency for an Essential Facility

Seismic Resiliency for an Essential Facility

Building Structure

- North and south wings are deficient with respect to "essential facility" seismic design criteria
- Building Systems
 - HVAC, fire system, and mechanical, electrical, and plumbing systems require updates

Seismic, HVAC, and Related Improvements

Lab Functional Improvements Alternatives Considered

Seismic, HVAC, and Related Improvements

Lab Functional Improvements

Alternatives Considered

Structural Modifications to Achieve Essential Facility

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Seismic, HVAC, and Related Improvements

Lab Functional Improvements Alternatives Considered

Space Planning Study

- Study Execution
 - 9 months, 23 workshops, 4 detailed concepts
 - 3 retrofit alternatives
 - 1 new facility alternative
- Multi-disciplinary team of experts
 - Metropolitan engineering and water quality staff combined with specialty lab consulting support
- Study Goals and Objectives
 - Provide Metropolitan with a path forward to address critical needs
 - Seismic resiliency
 - Water quality analyses and research
 - Support operations to optimize water treatment
 - Continue leading the industry on emerging water quality issues

Space Planning Study Conclusions and Recommendations

Current layout not Additional usable Construction is too optimized for staff, space will be required disruptive for lab visitors, and sample in 5 to 10 years activities movement Create lab space Add additional Relocate staff that reduces 30,000 sq ft of during potential for cross new laboratory construction to contamination temp facility space **Combine seismic** Create purpose-Optimize use of built visitor/tour upgrades and lab existing spaces upgrades amenities

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Seismic, HVAC, and Related Improvements

Lab Functional Improvements Alternatives Considered

Alternatives Considered

- Retrofit and expansion of existing building
 - Cost-effective alternative
 - Involves relocation of staff during construction
- New building
 - More expensive than retrofit/expansion option
 - Utilizes extensive vacant property at La Verne site

Both alternatives result in a seismically resilient, state-of-the-art laboratory prepared for future needs

Retrofit versus New Building – Space Considerations

- Existing Lab location
 - Maximizes use of existing footprint
 - Uses existing utility connections
 - Can be isolated from plant operations
- New Building
- Space is limited for new improvements
 - Proposed new location may impact plant operations and future needs
 - Supplemental treatment for recycled water
 - New utilities for lab will impact future projects
 - Crossings and interferences

Retrofit versus New Building – Construction Contract

	Retrofit	New Building
	Utilize/expand	Develop new site
	existing site	at La Verne
Building Cost Total Finished sq ft	\$900 / sq ft	\$1,200/ sq ft
Total Finished sq ft	90k	90k
Building Cost	\$81M	\$110M
Temp Facilities	\$5M	\$1M
New Utilities	-	\$8M
Total*	\$86M	\$119M

*Does not include soft costs (i.e., construction management, engineering support, etc.)

Seismic, HVAC, and Related Improvements

Lab Functional Improvements Alternatives Considered

Recommended Approach – Retrofit Existing Lab

- Build a seismically resilient, state-of-the-art laboratory to meet requirements and challenges for the next 30 years
 - Retrofit Existing Building
 - Seismic retrofit to essential facility criteria
 - Functional space improvements and necessary utility upgrades
 - Add Additional Space to Existing Building
 - Up to 30,000 sq ft of new lab space
- New Lab Equipment
 - Coordinate existing CIP for new lab equipment with overall building construction schedule

Next Steps

- Receive committee feedback on proposed improvements to Water Quality Lab
- February 2022 Board Action
 - Authorization of new consulting agreements to support planning/design effort for retrofit/expansion of Water Quality Lab
 - Technical Design Services
 - Environmental Planning Support

