

LCI Lake Water Quality Summary

General Information

Lake Name:

Halls Pond

Location:

Halls Pond County Park, Town of West Hempstead, Suffolk County, New York

Basin:

Atlantic Ocean/Long Island Sound Basin

Size:

0.8 hectares (2.0 acres)

Lake Origins:

man-made

Major Tributaries:

Tributary to Smith Pond

Lake Tributary to:

Minor tributary to Smith Pond

Water Quality Classification:

C (best intended use: secondary contact recreation)

Sounding Depth:

1.8 meters (6 feet) at the outlet

Sampling Coordinates:

Latitude: 40.68773, Longitude: -73.66061

Sampling Access Point:

Hempstead Ave

Monitoring Program:

Lake Classification and Inventory (LCI) Survey

Sampling Dates:

6/25/2009, 7/22/09, 8/21/2009, 9/21/2009

Samplers:

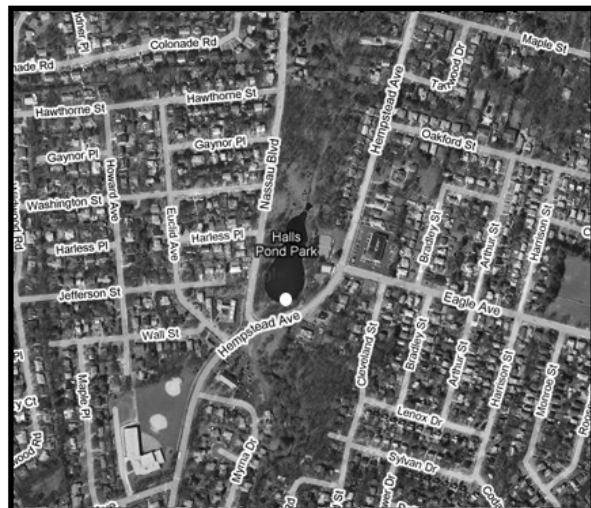
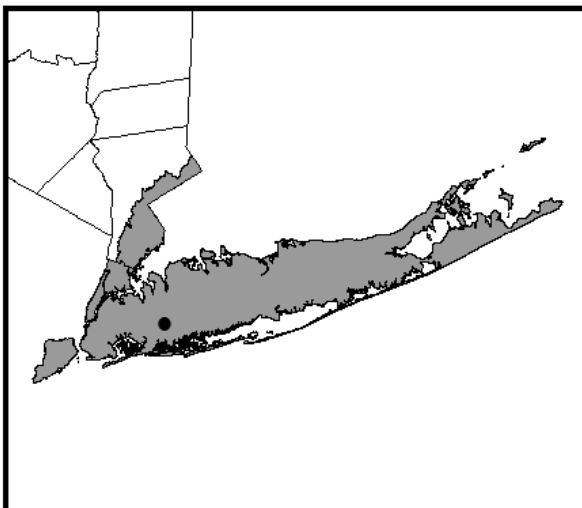
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Lake Map

(sampling location marked with a circle)



Background and Lake Assessment

Halls Pond is a small waterbody in the Town of West Hempstead. The pond is part of Halls Pond County Park managed by Nassau County. The park provides a paved walking trail around the pond and a small bridge crosses the inlet at the northern end of the pond. Visitors to the park walk on the trail and rest on the benches that surround the pond. The tributary that feeds the pond originates in the Garden City area and drains predominately high density residential areas.

The pond was included in the New York State DEC Division of Water's 2009 intensive (monthly sampling) Lake Classification and Inventory (LCI) survey of the Atlantic Ocean/ Long Island Sound (AO/LIS) basin. Inclusion in the survey was based on an "Impacted Segment" listing in The 2000 AO/LIS Waterbody Inventory and Priority Waterbodies List (WIPWL). The WIPWL states:

"Fish consumption in Halls Pond is impaired due to a specific NYS DOH health advisory that recommends eating no carp or goldfish because of elevated chlordane. (2000-01 NYS DOH Health Advisories).

Aquatic life support and recreational uses (swimming, fishing, boating) in the pond are also affected by high nutrient loads, silt, sedimentation and resulting aquatic weed growth and occasional algal blooms. Stormwater and urban nonpoint runoff are the sources of pollutants. The pond is included in the Nassau County Suburban Pond Management Plan. (Nassau County WQCC, 1998)

Sewering of the area has reduced groundwater recharge to the pond and resulted in falling water levels. The county completed dredging of the pond and installed a bentonite liner, but pond still does not hold water during dry periods. (Nassau County WQCC, October 2000) (NYSDEC 2002)."

There continues to be a fish consumption advisory for the pond that recommends not eating any carp or goldfish from the pond due to chlordane contamination (2009-2010 NYS DOH Health Advisories)

From the data collected in 2009, Halls Pond can generally be characterized as *eutrophic*, or highly productive. The water clarity reading (TSI = 71, typical of *eutrophic* lakes) was higher than expected given the average phosphorus reading (TSI = 87, typical of *eutrophic* lakes), but was lower than expected given the chlorophyll *a* reading (TSI = 60, typical of *eutrophic* lakes). These data indicate that algae levels tend to be high in the pond and that baseline nutrient levels support persistent algal blooms. These data also indicate that chlorophyll *a* levels are not the only factor controlling water clarity.

The water was observed to have a grayish brown color throughout the summer. The coloration may be due to large amounts of silt, sediment and other debris in the water column. Water samples indicated high levels of chlorophyll *a* (algae) in the water column throughout the summer. These high levels contribute to the low water clarity readings. No aquatic plants were observed in the pond. The lack of aquatic vegetation may be due to the high flow and reduced water clarity observed in the pond.

Like most shallow lakes, Halls Pond does not exhibit thermal stratification, in which depth zones (warm water on top, cold water on the bottom during the summer) are established. Temperature and dissolved oxygen readings are consistent throughout the water column. Dissolved oxygen levels were low even just below the pond's surface during the June, July and August sampling events. pH readings ranged from highly acidic to slightly alkaline. The June and July pH readings were below the state's pH standards and may indicate acidic runoff entering the pond from runoff. Alkalinity readings indicate the pond has a poor buffering capacity to acidic inputs. Conductivity readings indicate soft water (low ionic strength) although during the August sampling event there was a high conductivity reading. If this reading were accurate, it may be due to a recent rain event bringing runoff containing high levels of dissolved salts to the pond. The pond was found to be less than 2 meters in depth at its deepest, prompting monitoring at the outlet. Large amounts of leaves and debris, including trash were observed in the pond near the outlet, although not in the immediate area chosen for water sampling.

Chloride levels were found to be in the moderate range and may indicate impacts from road salting or other runoff through developed areas. Phosphorus and iron levels were above the state's guidance values with nitrogen levels being elevated. The surface dissolved oxygen levels recorded in June, July and August were below the state's guidance values to protect aquatic life.

A sediment sample was taken from the pond and analyzed for contaminants as well as toxicity. Sediment from the pond was found to have levels of lead above the Threshold Effect Concentration (TEC). The TEC represents the concentration below which adverse effects to sediment biota are not expected to occur. The Microtox® analysis showed the sediment to be non-toxic.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Halls Pond is not classified for use as a potable water supply. Although the LCI data are not sufficient to evaluate potable water use, these data suggest that the lake water would require substantial treatment to serve as a potable water supply. Surface water withdrawals may be impacted by elevated algae levels, high nutrient levels, and elevated iron levels.

Contact Recreation (Swimming)

Halls Pond is not classified for contact recreation- swimming and bathing. It is unlikely that people currently swim in the pond. Bacteria data are needed to evaluate the safety to Halls Pond for swimming-these are not collected through the LCI. The data collected through the LCI show that the water clarity was consistently below the New York State Department of Health's standard of 1.2 meters to protect the safety of swimmers. The shallow nature of the pond and the large amounts of debris observed would make swimming in the pond difficult.

Non-Contact Recreation (Boating and Fishing)

The reduced water clarity and the observation of trash and other debris in the water column may discourage individuals from wanting to partake in non-contact recreation. The shallow nature of the pond and the large amounts of debris observed made boating in the pond difficult. These conditions may also make fishing difficult. There is a fish consumption advisory that recommends not eating any carp or goldfish from the pond due to chlordane contamination.

Aquatic Life

The low pH levels observed in June and July, the elevated sediment iron levels, and the low dissolved oxygen levels recorded in June, July and August are not supportive of aquatic life. Additional biological studies would need to be conducted to fully evaluate water and sediment quality and habitat impacts to aquatic life.

Aesthetics

Reduced water clarity and the presence of trash and other debris in the pond detract from the aesthetics of the pond.

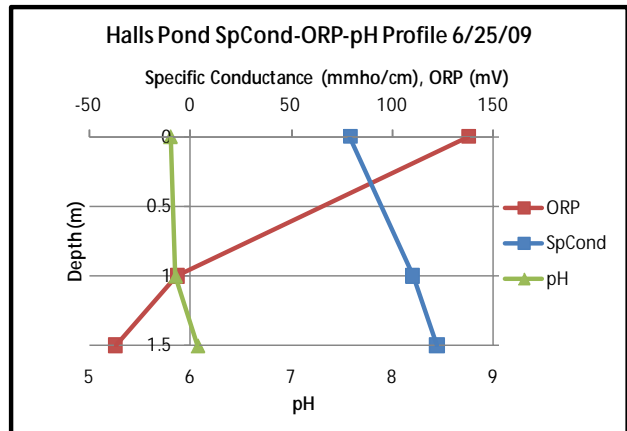
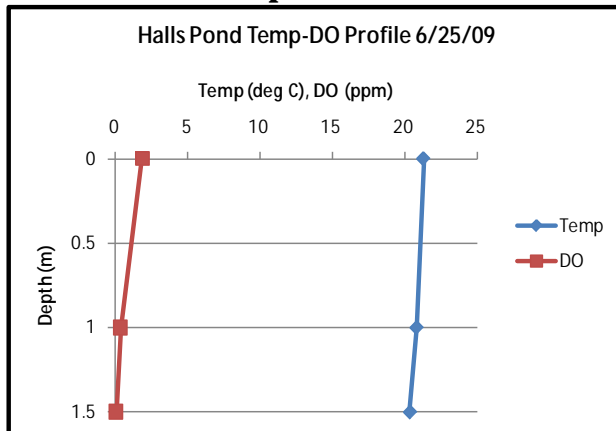
Additional Comments

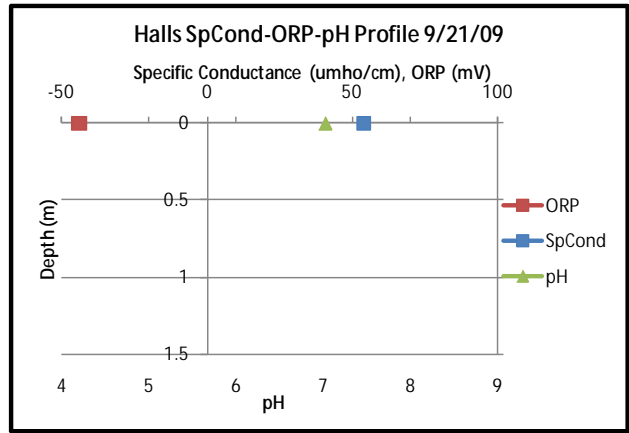
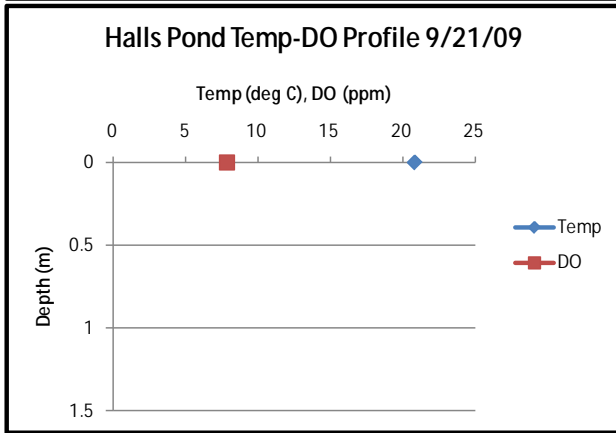
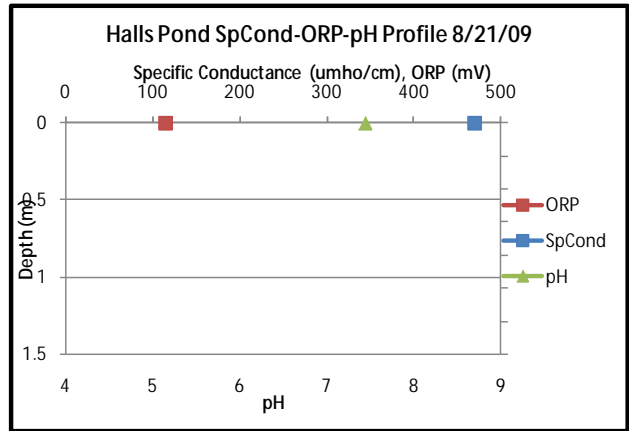
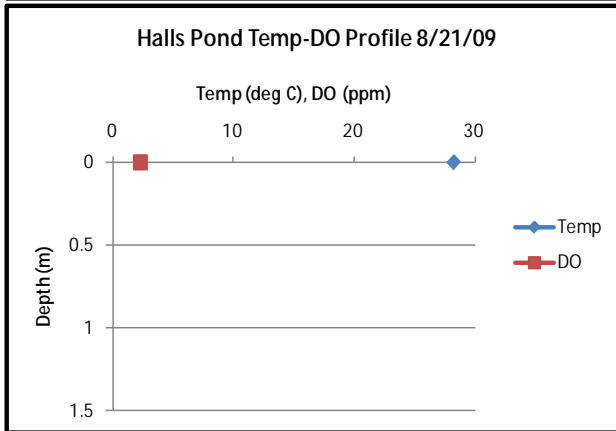
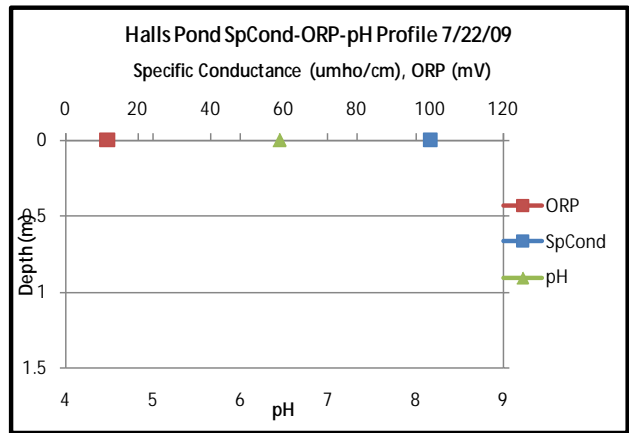
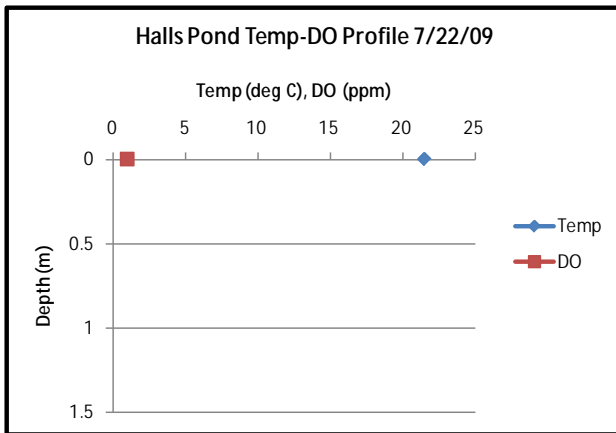
1. Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds.
2. The water level in the pond appeared to be low during many of the sampling events with water draining out of the pond through small cracks in the spillway rather than over the top of the spillway. This would be consistent with the language in the WIPWL regarding the pond not holding water during dry periods.

Aquatic Plant IDs

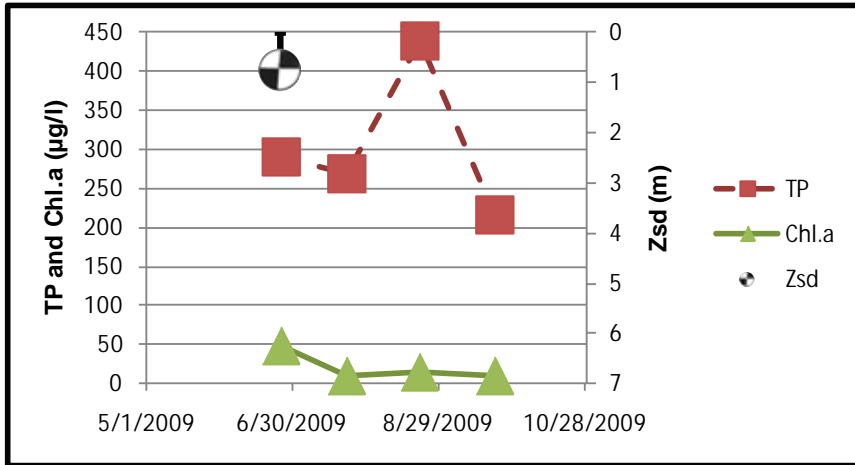
No exotic or native plants were observed.

Time Series: Depth Profiles





Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
SECCHI	meters	3	> 0.3*	0.48*	0.75	Eutrophic	100% of readings violate DOH guidelines
TSI-Secchi			< 77.3*	70.6*	64.1	Eutrophic	No pertinent water quality standards
TP	mg/l	4	0.217	0.3035	0.438	Eutrophic	100% of readings violate DOH guidelines
TSI-TP			81.7	86.5	91.8	Eutrophic	No pertinent water quality standards
TSP	mg/l	4	0.0582	0.1039	0.15	High % soluble Phosphorus	No pertinent water quality standards
NOx	mg/l	4	0.0053	0.1547	0.339	Potentially high nitrate	No readings violate DOH guidance value
NH4	mg/l	4	0.035	0.232	0.325	Potentially high ammonia	No readings violate DOH guidance value
TKN	mg/l	4	0.89	1.53	2.66	Elevated organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	4	8.75	12.13	13.75	Nutrient Limitation Unclear	No pertinent water quality standards
CHLA	ug/l	4	10.7	21.53	49.2	Eutrophic	No pertinent water quality standards
TSI-CHLA			53.9	60.7	68.8	Eutrophic	No pertinent water quality standards
Alkalinity	mg/l	4	16.9	21.9	27.9	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	4	30	32.5	40	Highly Colored	No pertinent water quality standards
TOC	mg/l	4	5.1	6.4	8.5		No pertinent water quality standards
Ca	mg/l	4	6.25	8.2	10.4	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	4	0.816	1.339	2.42	Taste or odor likely	100% of readings violate DOH guidelines
Mn	mg/l	4	0.059	0.079	0.099		No readings violate DOH guidance value
Mg	mg/l	4	2	2.47	3.4		No readings violate DOH guidance value
K	mg/l	4	1.97	2.42	3.2		No pertinent water quality standards
Na	mg/l	4	8.01	12.55	19.1		No readings violate DOH guidance value
Cl	mg/l	4	11.9	18.13	27.8	Moderate road salt runoff	No readings violate DOH guidance value
SO4	mg/l	4	7.2	9.45	12.6		No readings violate DOH guidance value

* The July and August water clarity readings were based on the maximum depth at the sampling location.

Lake Perception

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
WQ Assessment	1-5, 1 best	4	4	4	4	High Algae Levels	No pertinent water quality standards
Weed Assessment	1-5, 1 best	4	1	1	1	Plants Not Visible	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	4	3	4.25	5	Substantially Impaired	No pertinent water quality standards

Legend Information

General Legend Information

Surface Samples = integrated sample collected in the first 2 meters of surface water
 N = number of samples
 SECCHI = Secchi disk water transparency or clarity - measured in meters (m)

TSI-SECCHI = Trophic State Index calculated from Secchi, = $60 - 14.41 * \ln(\text{Secchi})$

Laboratory Parameters

ND	= Non-Detect, the level of the analyte in question is at or below the laboratory's detection limit
TP	= total phosphorus- milligrams per liter (mg/l) Detection limit = 0.003 mg/l; NYS Guidance Value = 0.020 mg/l
TSI-TP	= Trophic State Index calculated from TP, = $14.42 * \ln(\text{TP} * 1000) + 4.15$
TSP	= total soluble phosphorus, mg/l Detection limit = 0.003 mg/l; no NYS standard or guidance value
NOx	= nitrate + nitrite nitrogen, mg/l Detection limit = 0.01 mg/l; NYS WQ standard = 10 mg/l
NH4	= total ammonia, mg/l Detection limit = 0.01 mg/l; NYS WQ standard = 2 mg/l
TKN	= total Kjeldahl nitrogen (= organic nitrogen + ammonia), mg/l Detection limit = 0.01 mg/l; no NYS standard or guidance value
TN/TP	= Nitrogen to Phosphorus ratio (molar ratio), = $(\text{TKN} + \text{NOx}) * 2.2 / \text{TP}$ > 30 suggests phosphorus limitation, < 10 suggests nitrogen limitation
CHLA	= chlorophyll <i>a</i> , micrograms per liter ($\mu\text{g/l}$) or parts per billion (ppb) Detection limit = 2 $\mu\text{g/l}$; no NYS standard or guidance value
TSI-CHLA	= Trophic State Index calculated from CHLA, = $9.81 * \ln(\text{CHLA}) + 30.6$
ALKALINITY	= total alkalinity in mg/l as calcium carbonate Detection limit = 10 mg/l; no NYS standard or guidance value
TCOLOR	= true (filtered or centrifuged) color, platinum color units (ptu) Detection limit = 5 ptu; no NYS standard or guidance value
TOC	= total organic carbon, mg/l Detection limit = 1 mg/l; no NYS standard or guidance value
Ca	= calcium, mg/l Detection limit = 1 mg/l; no NYS standard or guidance value
Fe	= iron, mg/l Detection limit = 0.1 mg/l; NYS standard = 0.3 mg/l
Mn	= manganese, mg/l Detection limit = 0.01 mg/l; NYS standard = 0.3 mg/l
Mg	= magnesium, mg/l Detection limit = 2 mg/l; NYS standard = 35 mg/l
K	= potassium, mg/l Detection limit = 2 mg/l; no NYS standard or guidance value
Na	= sodium, mg/l Detection limit = 2 mg/l; NYS standard = 20 mg/l
Cl	= chloride, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l
SO4	= sulfate, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l

Field Parameters

Depth	= water depth, meters
Temp	= water temperature, degrees Celsius
D.O.	= dissolved oxygen, in milligrams per liter (mg/l) or parts per million (ppm) NYS standard = 4 mg/l; 5 mg/l for salmonids
pH	= powers of hydrogen, standard pH units (S.U.) Detection limit = 1 S.U.; NYS standard = 6.5 and 8.5
SpCond	= specific conductance, corrected to 25°C, micromho per centimeter ($\mu\text{mho/cm}$) Detection limit = 1 $\mu\text{mho/cm}$; no NYS standard or guidance value
ORP	= Oxygen Reduction Potential, millivolts (MV) Detection limit = -250 mV; no NYS standard or guidance value

Lake Assessment

- WQ Assessment = **water quality assessment**, 5 point scale, 1= crystal clear, 2 = not quite crystal clear, 3 = definite algae greenness, 4 = high algae levels, 5 = severely high algae levels
- Weed Assessment = **weed coverage/density assessment**, 5 point scale, 1 = no plants visible, 2 = plants below surface, 3 = plants at surface, 4 = plants dense at surface, 5 = plants cover surface
- Recreational Assessment = **swimming/aesthetic assessment**, 5 point scale; 1 = could not be nicer, 2 = excellent, 3= slightly impaired, 4 = substantially impaired, 5 = lake not usable

References

- NYSDEC. 2002. The 2000 Atlantic Ocean/ Long Island Sound Basin Waterbody Inventory and Priority Waterbodies List. NYSDEC, Albany, NY. Available online at http://www.dec.ny.gov/docs/water_pdf/pwlatlv202.pdf.