preliminary and partial load values

Purpose and Objectives

Spokane River Metals TMDL WAG meeting

By: Robert Steed,

IDEQ , Surface Water Ecologist

March 7, 2017

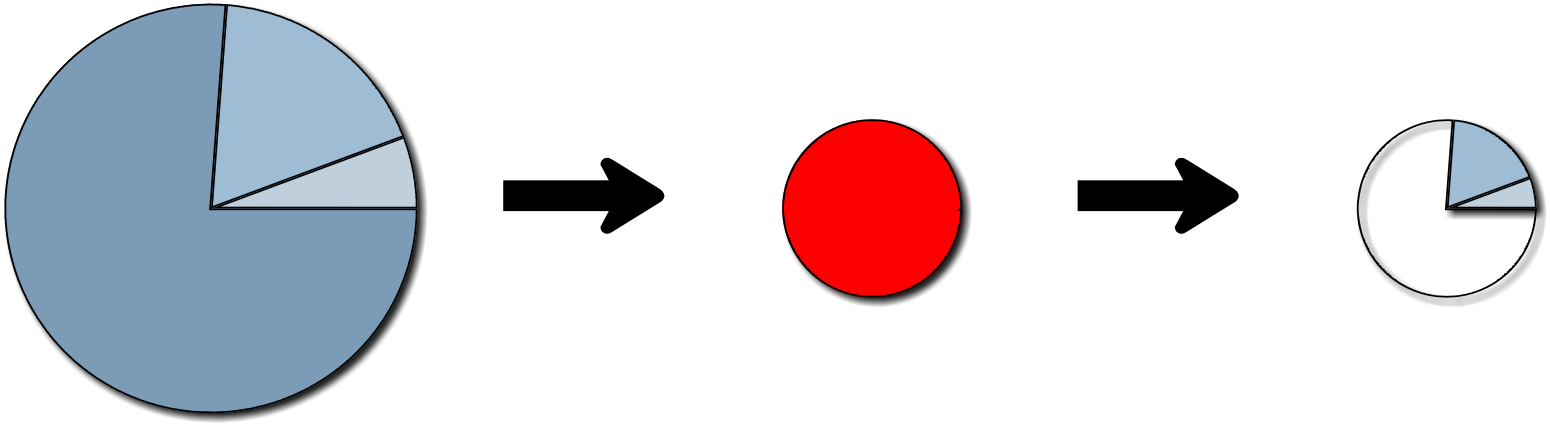
Spokane River Metals TMDL Watershed Advisory Group Meeting

- Idaho DEQ Coeur d'Alene Regional Office
- 3/7/2017
- 1:00 PM to 4:00 PM
- Osprey Conference Room
- 2110 Ironwood Parkway
- Coeur d'Alene ID 83814
- http://www.deq.idaho.gov/regional-offices-issues/coeur-dalene/basin-watershed-advisory-groups/spokane-river-wag/

Steps Forward

- Update strategy paper (on hold)
- Provide a preliminary load values to make best decision on strategy to be implemented.

What is a TMDL
(Total Maximum Daily Load)



Existing Load

Upstream Sources
Point Sources
Non-point Sources

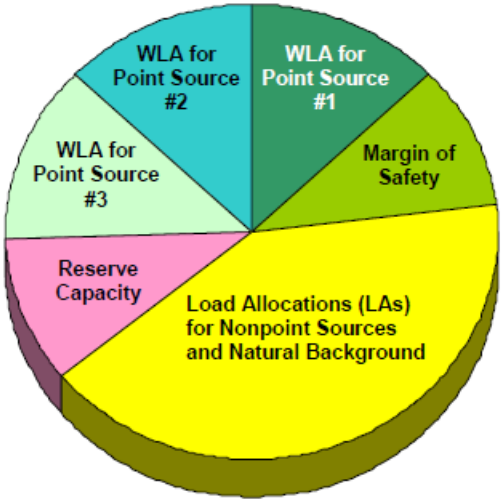
Target Load

Idaho Water Quality Standards
Numeric Criteria

Load Allocations

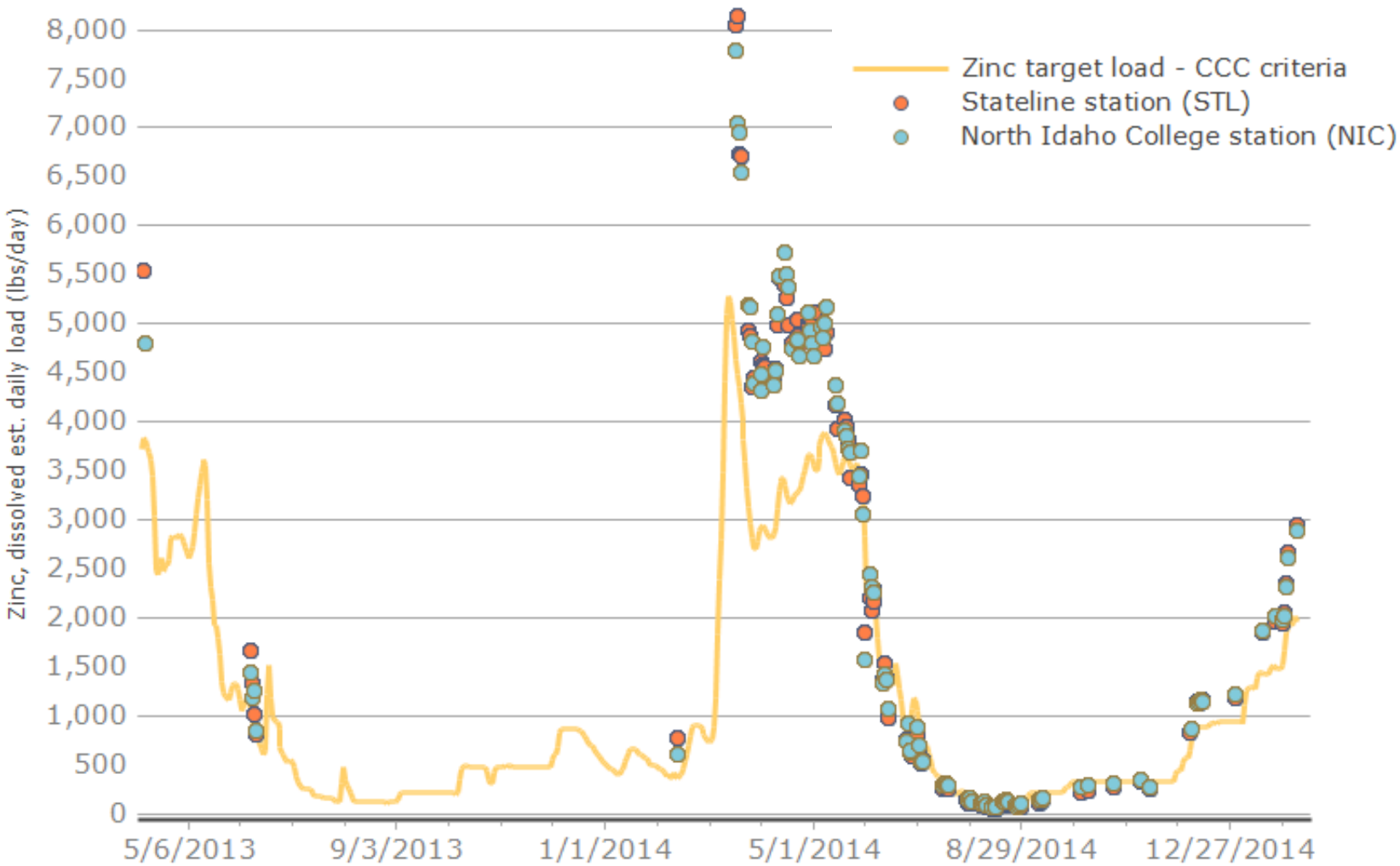
Point Sources
Non-point Sources

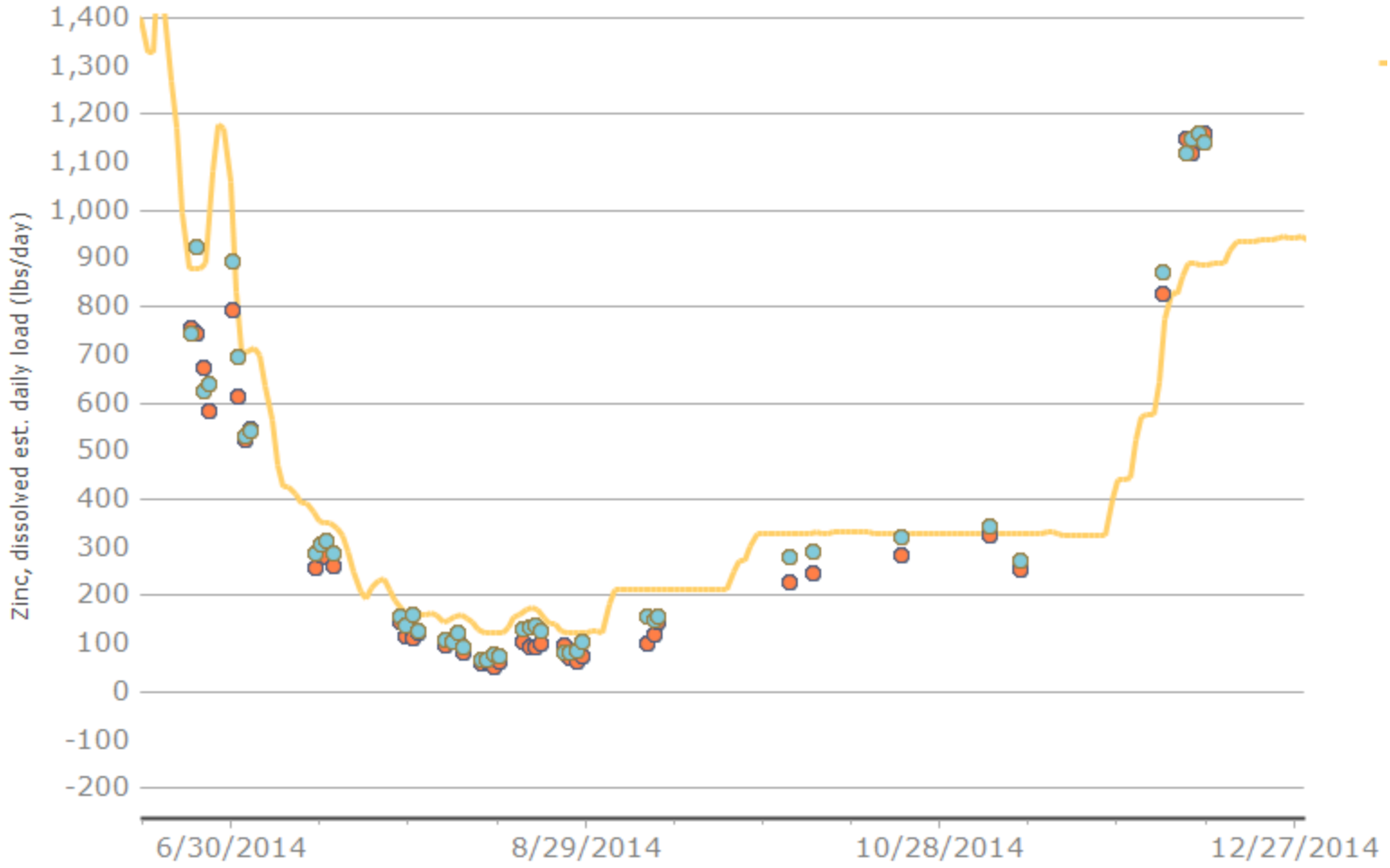
Exhibit 6-6 Parts of a TMDL



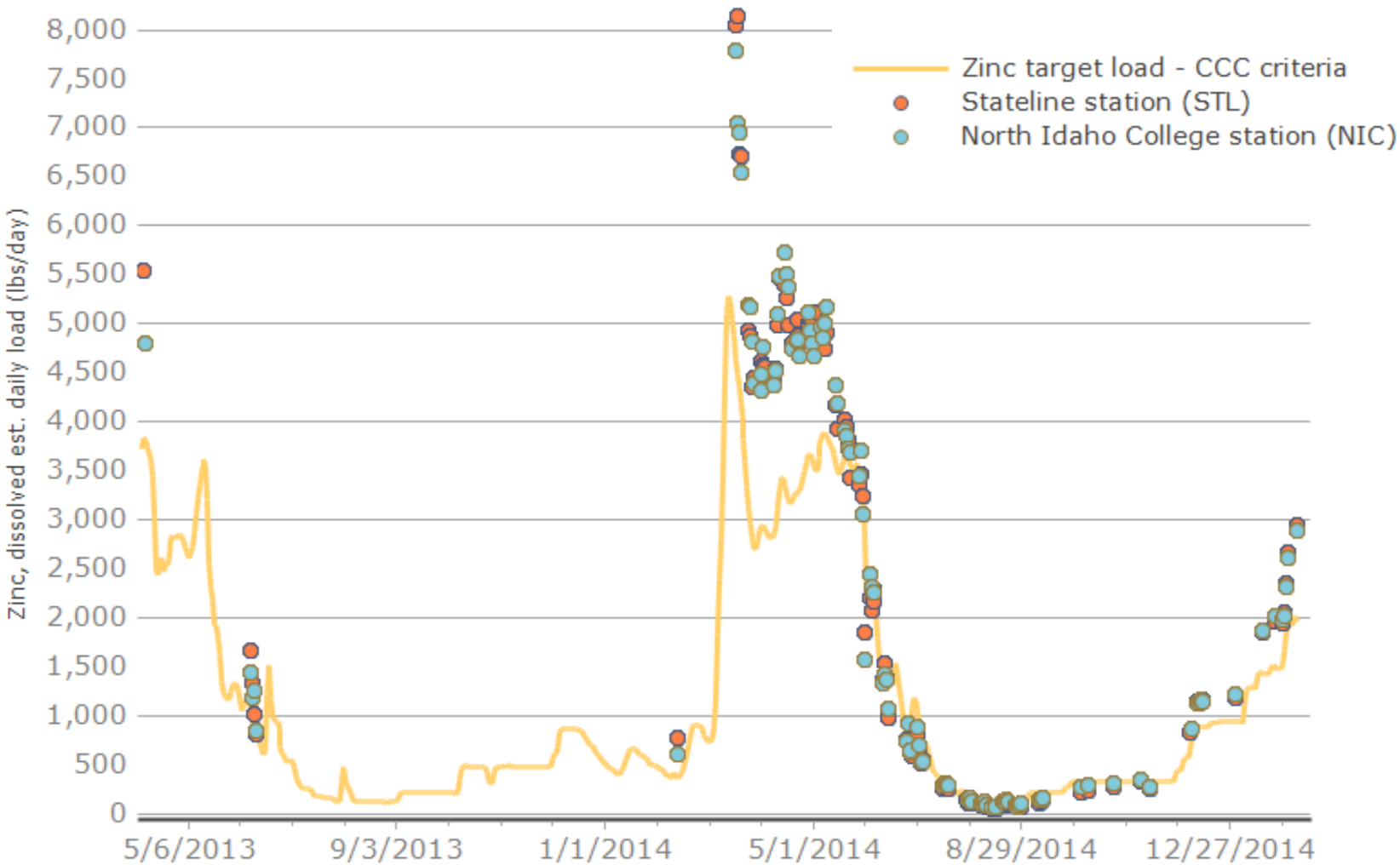
TMDL = ΣWLA + ΣLA + Margin of Safety + Reserve Capacity

Zinc 2014 load compared to criteria




Zinc, dissolved est. daily load (lbs/day)
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
-100
-200
6/30/2014
8/29/2014
10/28/2014
12/27/2014

Zinc 2014 load compared to criteria



Existing Load

Point Source	mean Q (mgd)	Tot-Cd UCL (µg/L)	Tot-Cd (lb/day)	Tot-Pb UCL (µg/L)	Tot-Pb (lb/day)	Tot-Zn UCL (µg/L)	Tot-Zn (lb/day)
CDA WWTP	3.38	0.0628	0.00177	0.907	0.0256	46.58	1.31
PF WWTP	2.39	0.0453	0.0009	0.472	0.0094	56.32	1.1
HARSB	1.14	0.0453	0.000431	0.823	0.0078	44.44	0.423
HARSB Seasonal							
Totals	6.91	0.1534	0.0	2.202	0.0	147.34	2.833

Design Load

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HARSB	2.4	0.0453	0.00091	0.823	0.016	44.44	0.89
HARSB Seasonal							
Totals	13.4	0.1534	0.0	2.202	0.081	147.34	5.49

2013 Permit Load Average Monthly Limit (values from final permit)

Point Source	design Q (mgd)	Tot-Cd limit (µg/L)	Tot-Cd (lb/day)	Tot-Pb limit (µg/L)	Tot-Pb (lb/day)	Tot-Zn limit (µg/L)	Tot-Zn (lb/day)
CDA WWTP	6.0	n/a	n/a	n/a	n/a	135	6.76
PF WWTP	5.0	n/a	n/a	2.00	0.0400	88.2	1.77
HARSB	2.4	n/a	n/a	2.05	0.0855	84.3	3.52
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Totals	13.4					307.5	12.05

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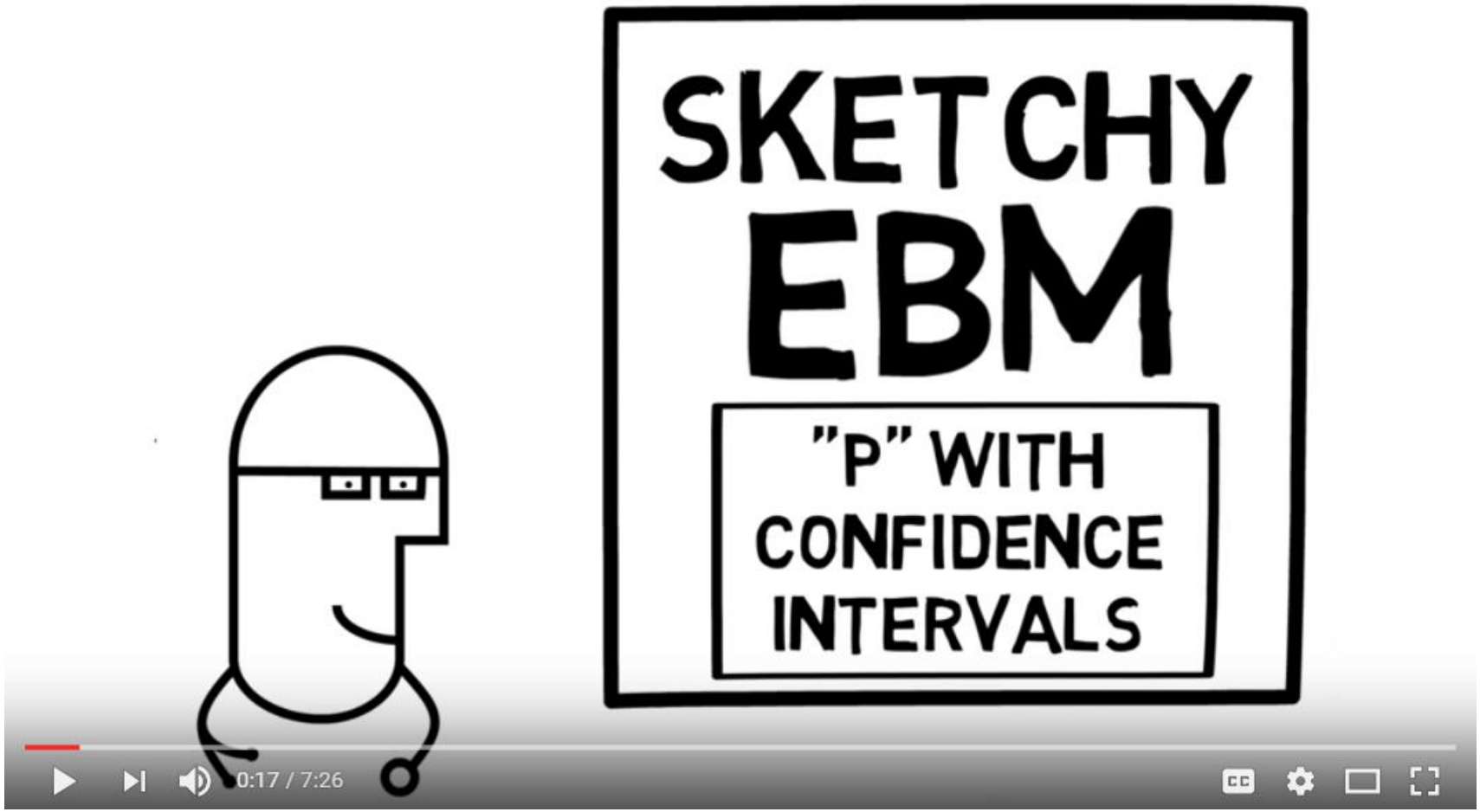
Confidence Intervals

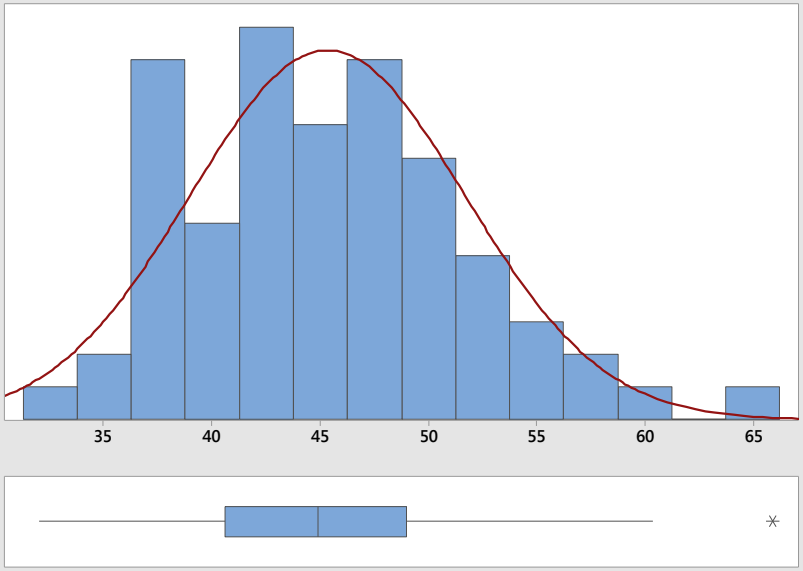


CDA WWTP Example

Level 3	Date	Time	Variable	Value
CDA WWTP Outflow	1/31/2010	12:00:00 PM	Zinc, total - Tot-Zn (µg/L) MAL	37.1
CDA WWTP Outflow	2/28/2010	12:00:00 PM	Zinc, total - Tot-Zn (µg/L) MAL	46.7
CDA WWTP Outflow	3/31/2010	12:00:00 PM	Zinc, total - Tot-Zn (µg/L) MAL	47.8
CDA WWTP Outflow	4/30/2010	12:00:00 PM	Zinc, total - Tot-Zn (µg/L) MAL	47.8
CDA WWTP Outflow	5/31/2010	12:00:00 PM	Zinc, total - Tot-Zn (µg/L) MAL	50.9
CDA WWTP Outflow	6/30/2010	12:00:00 PM	Zinc, total - Tot-Zn (µg/L) MAL	53.4
CDA WWTP Outflow	7/31/2010	12:00:00 PM	Zinc, total - Tot-Zn (µg/L) MAL	52.7
CDA WWTP Outflow	8/31/2010	12:0		
CDA WWTP Outflow	9/30/2010	12:0		
CDA WWTP Outflow	10/31/2010	12:0		
CDA WWTP Outflow	11/30/2010	12:0		
CDA WWTP Outflow	12/31/2010	12:0		
CDA WWTP Outflow	1/31/2011	12:0		
CDA WWTP Outflow	2/28/2011	12:0		
CDA WWTP Outflow	3/31/2011	12:0		
CDA WWTP Outflow	4/30/2011	12:0		
CDA WWTP Outflow	5/31/2011	12:0		
CDA WWTP Outflow	6/30/2011	12:0		
CDA WWTP Outflow	7/31/2011	12:0		
CDA WWTP Outflow	8/31/2011	12:0		
CDA WWTP Outflow	9/30/2011	12:0		
CDA WWTP Outflow	10/31/2011	12:0		
CDA WWTP Outflow	11/30/2011	12:0		

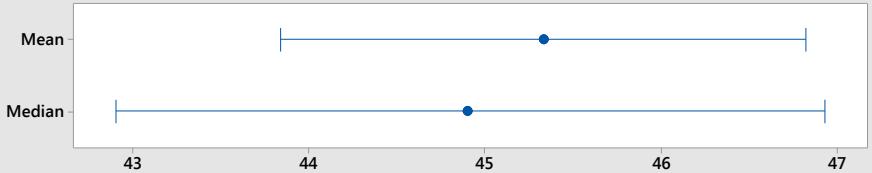
Filter

Summary Report for Total Zn (ug/L)



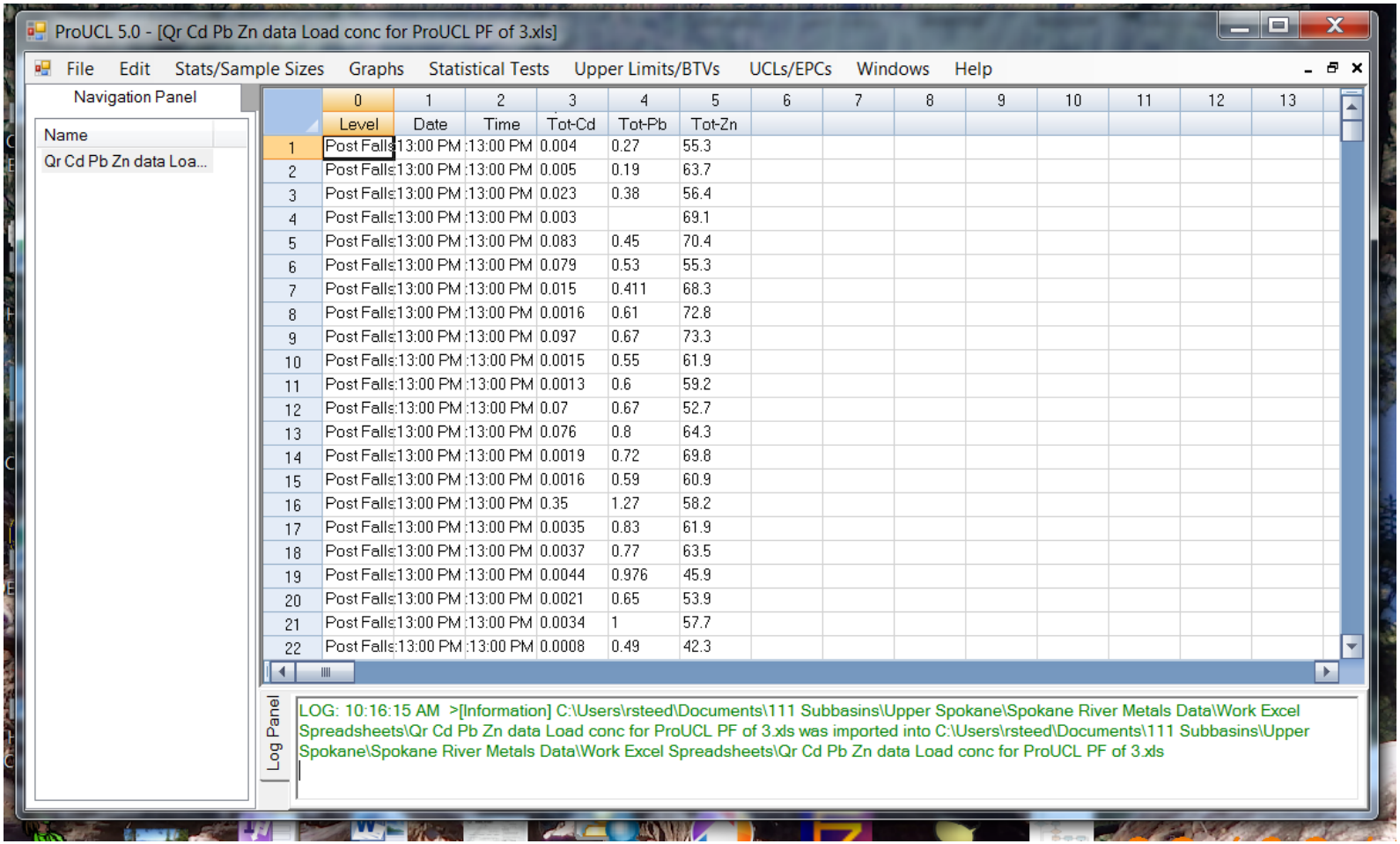
Anderson-Darling Normality Test	
A-Squared	0.44
P-Value	0.287
Mean	45.333
StDev	6.366
Variance	40.521
Skewness	0.633309
Kurtosis	0.652701
N	72
Minimum	32.000
1st Quartile	40.600
Median	44.900
3rd Quartile	48.975
Maximum	65.900
95% Confidence Interval for Mean	
43.837	46.829
95% Confidence Interval for Median	
42.900	46.934
95% Confidence Interval for StDev	
5.469	7.617

95% Confidence Intervals



ProUCL 5.0

normal, gamma, lognormal, non parametric UCLs



	0	1	2	3	4	5	6	7	8	9	10	11	12	13
	Level	Date	Time	Tot-Cd	Tot-Pb	Tot-Zn								
1	Post Falls	13:00 PM	13:00 PM	0.004	0.27	55.3								
2	Post Falls	13:00 PM	13:00 PM	0.005	0.19	63.7								
3	Post Falls	13:00 PM	13:00 PM	0.023	0.38	56.4								
4	Post Falls	13:00 PM	13:00 PM	0.003		69.1								
5	Post Falls	13:00 PM	13:00 PM	0.083	0.45	70.4								
6	Post Falls	13:00 PM	13:00 PM	0.079	0.53	55.3								
7	Post Falls	13:00 PM	13:00 PM	0.015	0.411	68.3								
8	Post Falls	13:00 PM	13:00 PM	0.0016	0.61	72.8								
9	Post Falls	13:00 PM	13:00 PM	0.097	0.67	73.3								
10	Post Falls	13:00 PM	13:00 PM	0.0015	0.55	61.9								
11	Post Falls	13:00 PM	13:00 PM	0.0013	0.6	59.2								
12	Post Falls	13:00 PM	13:00 PM	0.07	0.67	52.7								
13	Post Falls	13:00 PM	13:00 PM	0.076	0.8	64.3								
14	Post Falls	13:00 PM	13:00 PM	0.0019	0.72	69.8								
15	Post Falls	13:00 PM	13:00 PM	0.0016	0.59	60.9								
16	Post Falls	13:00 PM	13:00 PM	0.35	1.27	58.2								
17	Post Falls	13:00 PM	13:00 PM	0.0035	0.83	61.9								
18	Post Falls	13:00 PM	13:00 PM	0.0037	0.77	63.5								
19	Post Falls	13:00 PM	13:00 PM	0.0044	0.976	45.9								
20	Post Falls	13:00 PM	13:00 PM	0.0021	0.65	53.9								
21	Post Falls	13:00 PM	13:00 PM	0.0034	1	57.7								
22	Post Falls	13:00 PM	13:00 PM	0.0008	0.49	42.3								

Existing Load

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Permit Load

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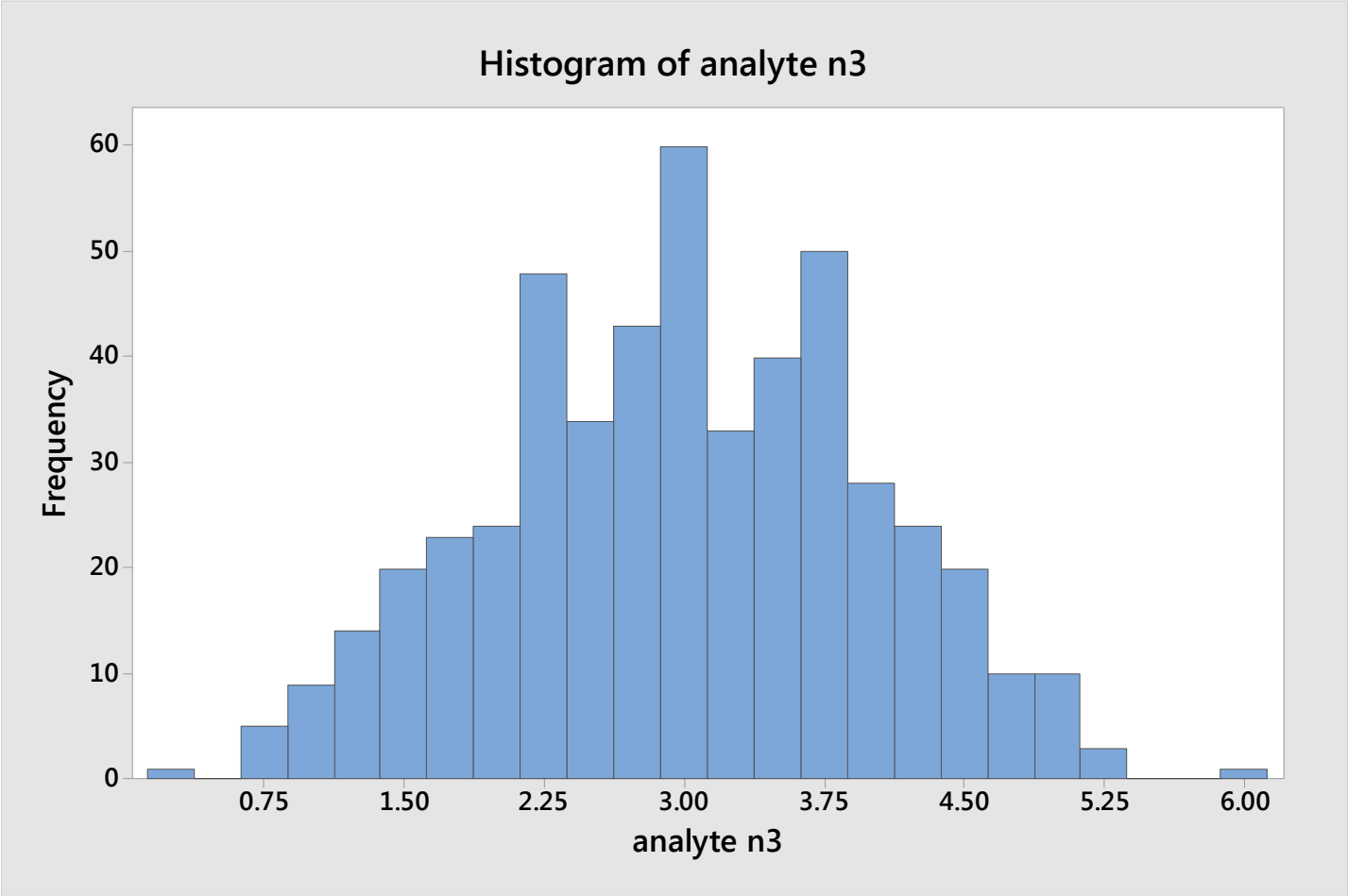
Normal distribution



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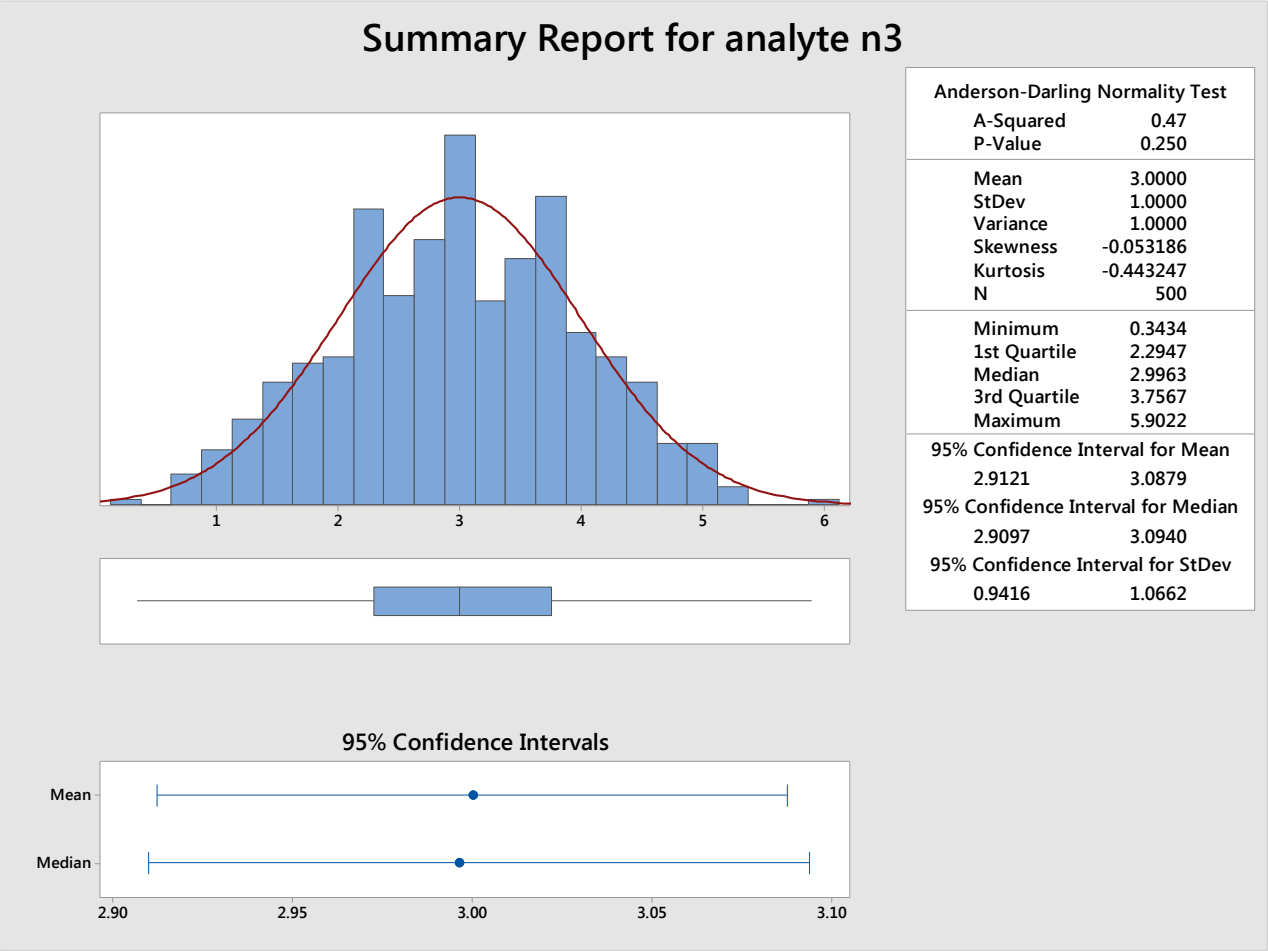
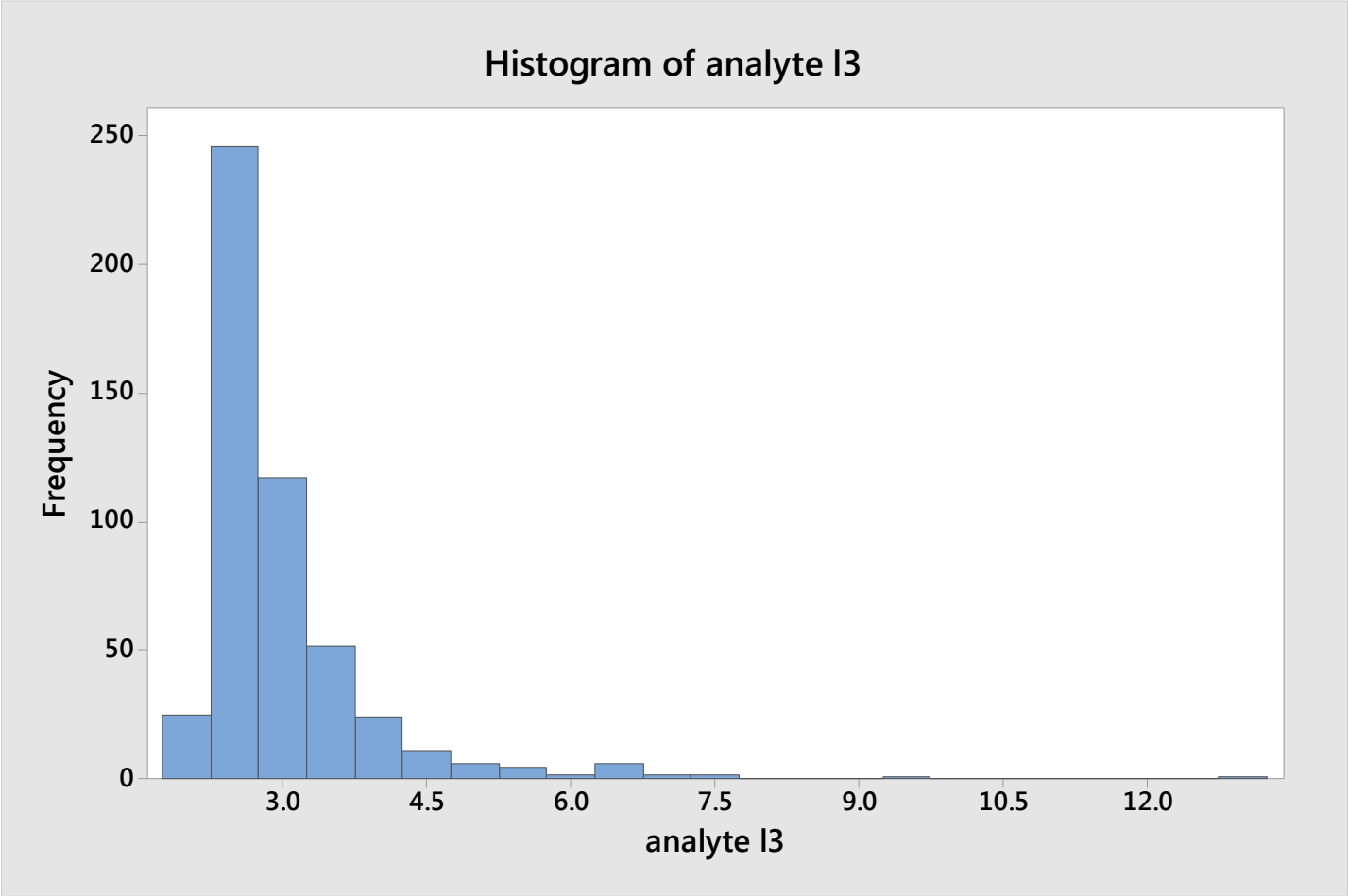


Lognormal distribution



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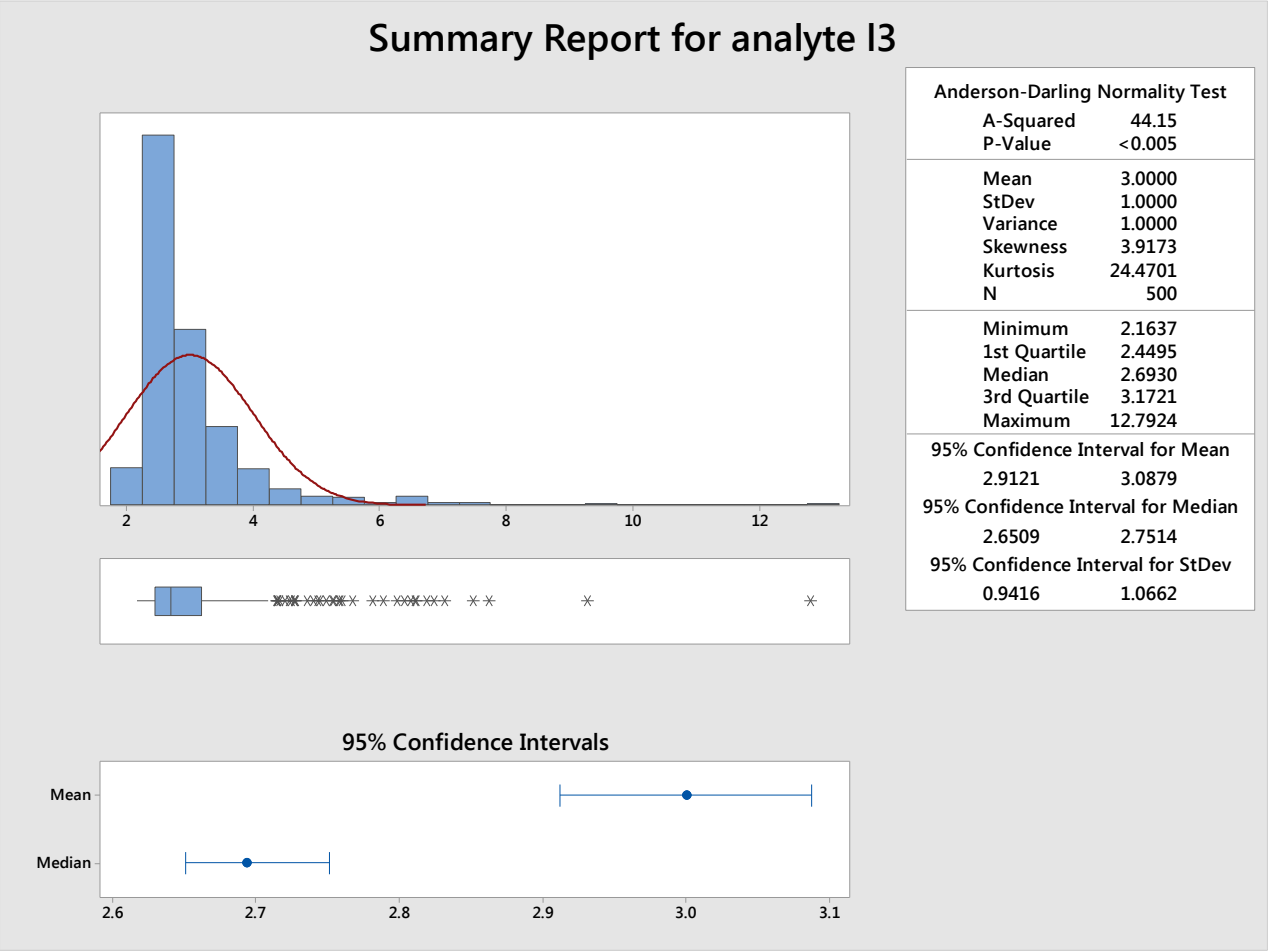


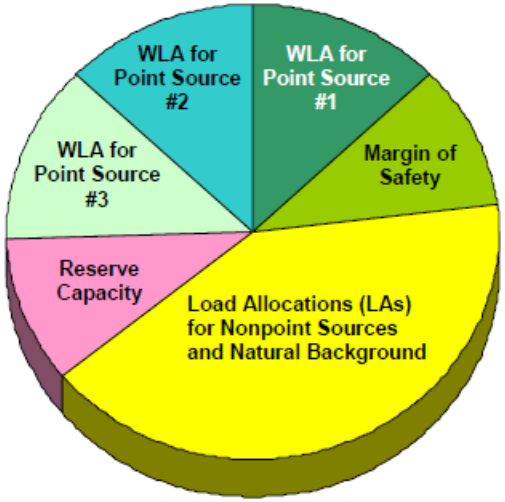
NPDES differs from CWA

"By studying effluent data for numerous facilities, EPA determined that daily pollutant measurements of many pollutants follow a *lognormal distribution*. The TSD procedures allow permit writers to project a critical effluent concentration (e.g., the 99th or 95th percentile of a lognormal distribution of effluent concentrations) from a limited data set using statistical procedures based on the characteristics of the lognormal distribution". – EPA NPDES Permit Writers' Manual, September 2010.

	Normal	Lognormal
95%tile	4.614676	4.828565
99%tile	5.041432	7.005628

TMDL Load Elements

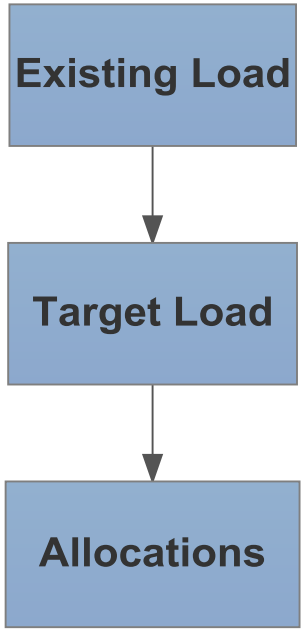
Exhibit 6-6 Parts of a TMDL



TMDL = ΣWLA + ΣLA + Margin of Safety + Reserve Capacity

- ∑LA = Upstream Sources + Natural Background + Nonpoint Sources
- ∑WLA = WWTP + Stormwater
- Reserve Capacity = difference between existing and design flows + permitting calculations
- Margin of Safety = conservative assumptions

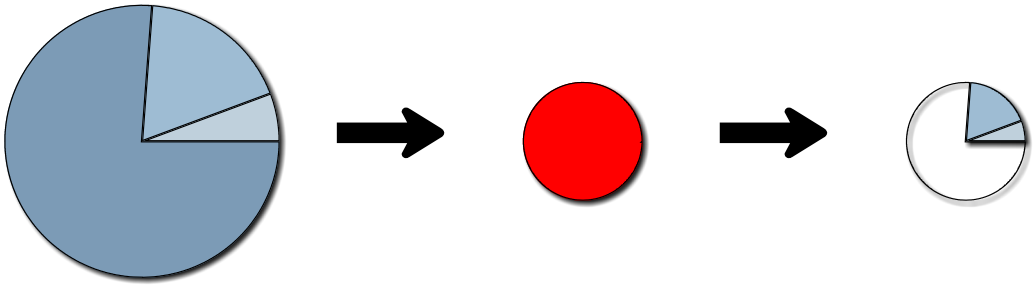
What our TMDLs may look like



- Allocations
  - Upstream sources, Nonpoint sources
    - Load (lbs./day)
  - WWTP (status quo)
    - Concentration (µg/L)
  - Stormwater
    - ?

WAG agreements and data gaps

- Which discharges are to be used?
- What seasons are TMDLs for?
- Calculations must be vetted
- Agreed upon total to dissolved translator

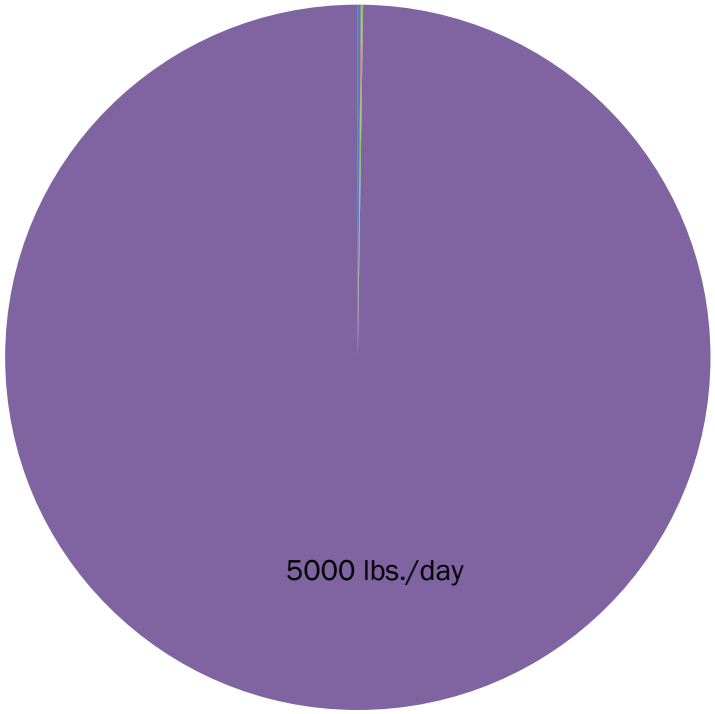


Existing Load
Upstream Sources
Point Sources
Non-point Sources

Target Load
Idaho Water Quality Standards
Numeric Criteria

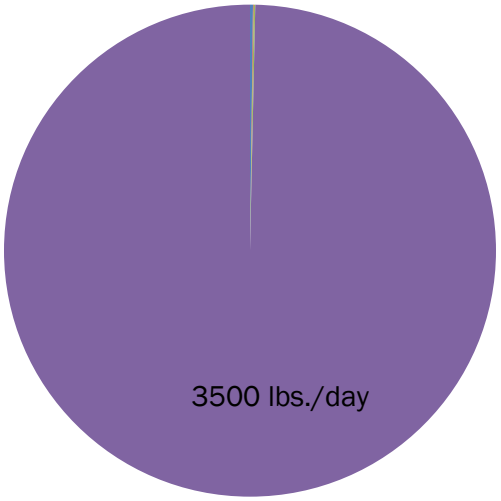
Load Allocations
Point Sources
Non-point Sources

Existing Zn Load May



CDA
PF
HARSB
Upstream Sources

Target Zn Load May



Spokane River WAG