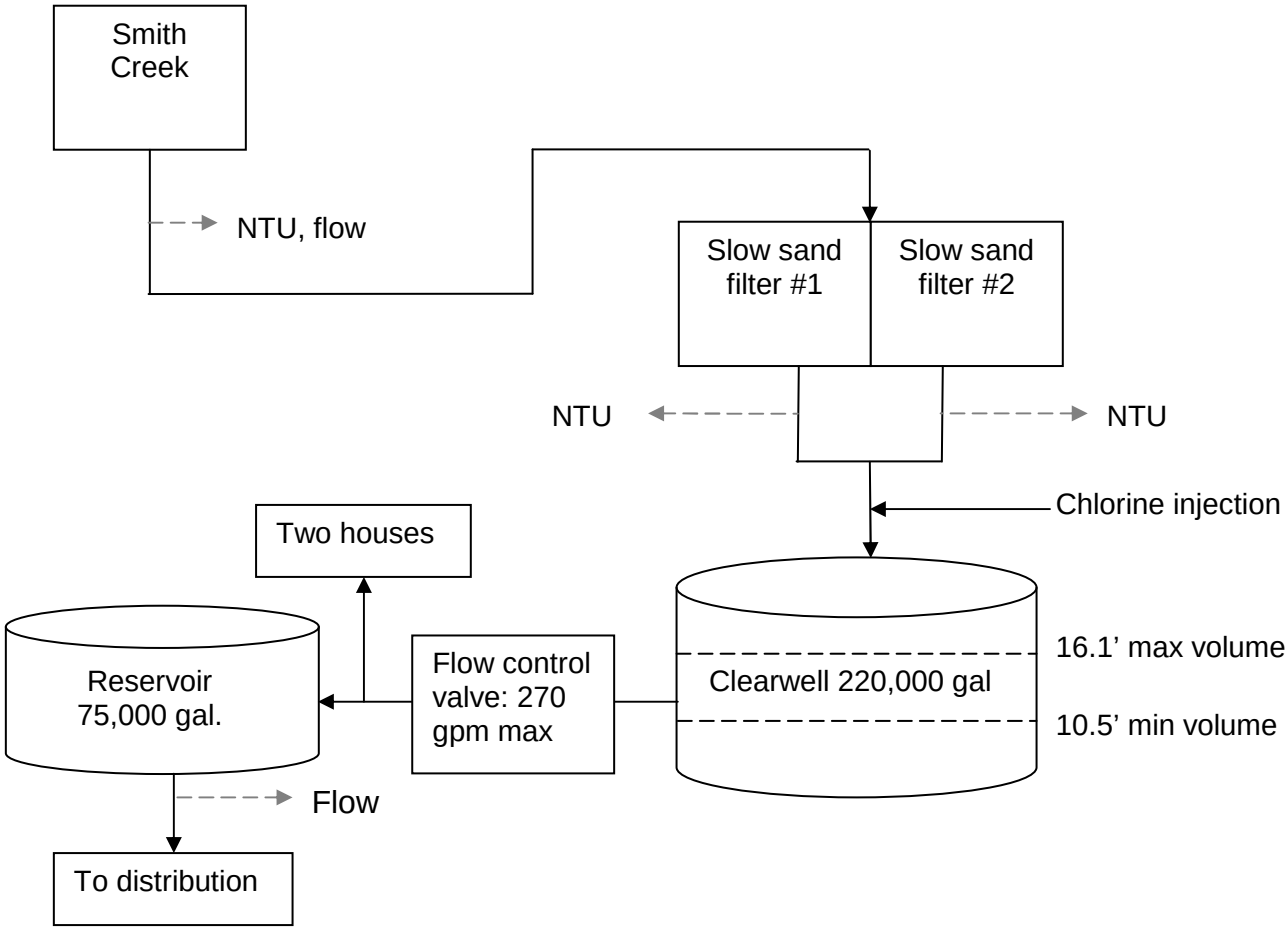
ESSENTIALS OF SURFACE WATER TREATMENT TRAINING

Exercise #1: Tracer studies

Directions: Look at the diagram and answer the questions.

Figure 1: Water Treatment Plant



Questions:

1. If this was your treatment plant, highlight the part of the plant where you might conduct a tracer study.

2. In a "worst-case scenario" tracer study, what would the flow rate be? _____

3. In a "worst-case scenario" tracer study, what would the clearwell level be? _____

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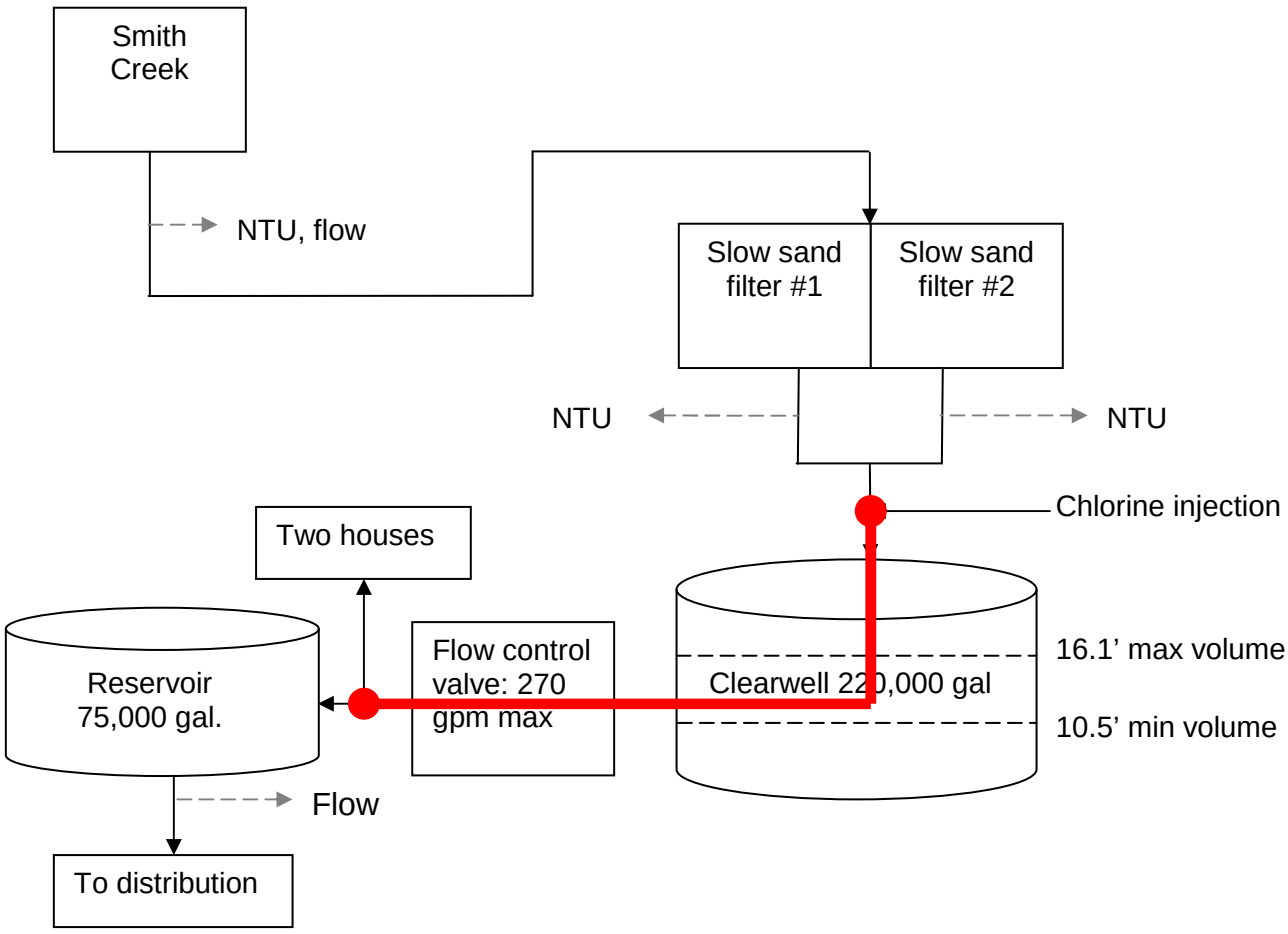


Questions:

1. If this was your treatment plant, highlight the part of the plant where you might conduct a tracer study.

2. In a "worst-case scenario" tracer study, what would the flow rate be? **270 gpm**

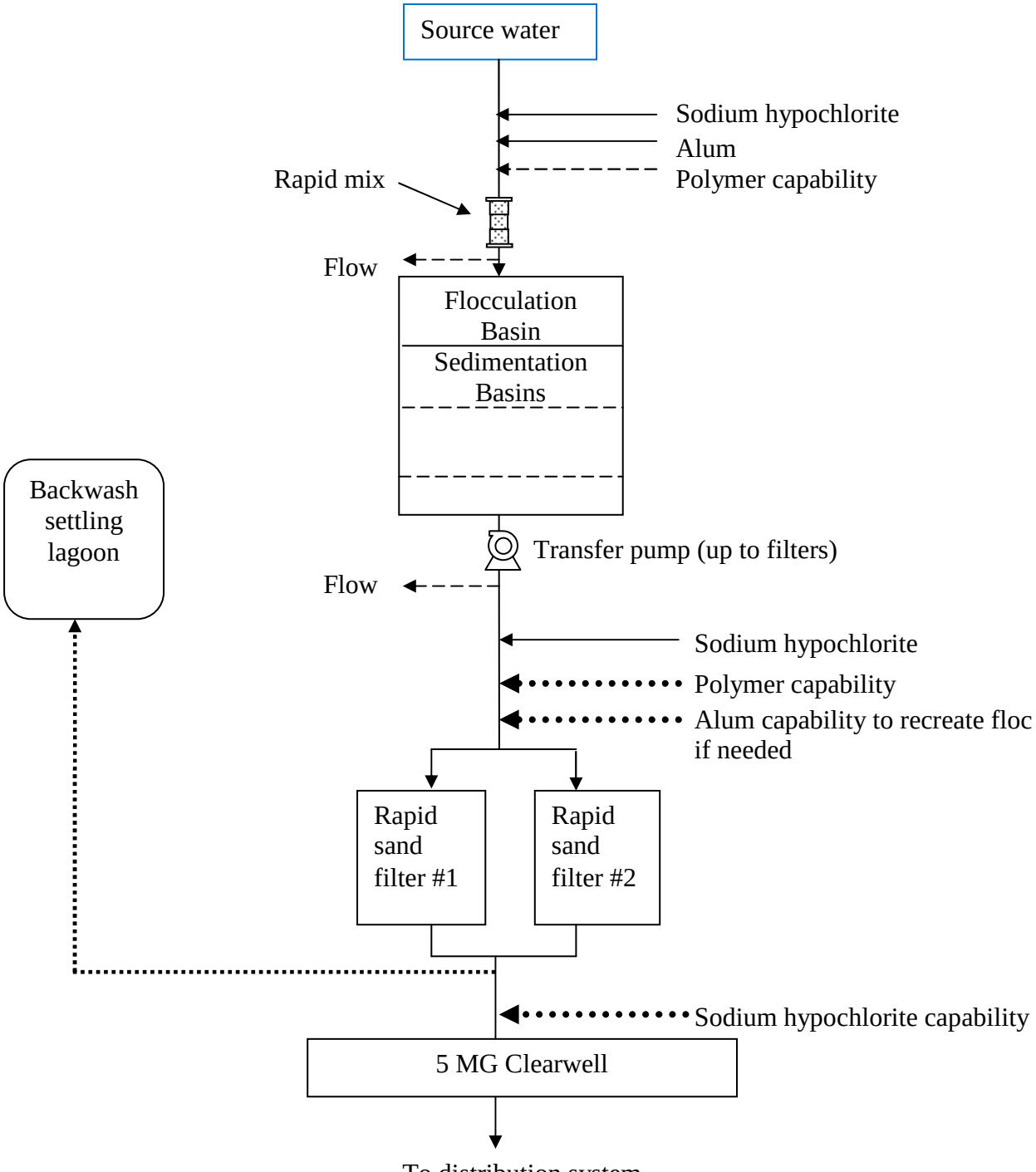
3. In a "worst-case scenario" tracer study, what would the clearwell level be? **10.5 feet**

ESSENTIALS OF SURFACE WATER TREATMENT TRAINING

Exercise #2: Proper sampling locations in a treatment plant for turbidity, chlorine residual, and TOC

Directions: Mark on the diagrams the proper sampling locations in a treatment plant for all of the following:

- Raw turbidity
- Individual filter effluent turbidity (IFE)
- Combined filter effluent turbidity (CFE)
- Chlorine residual
- Raw TOC & alkalinity
- Filtered TOC



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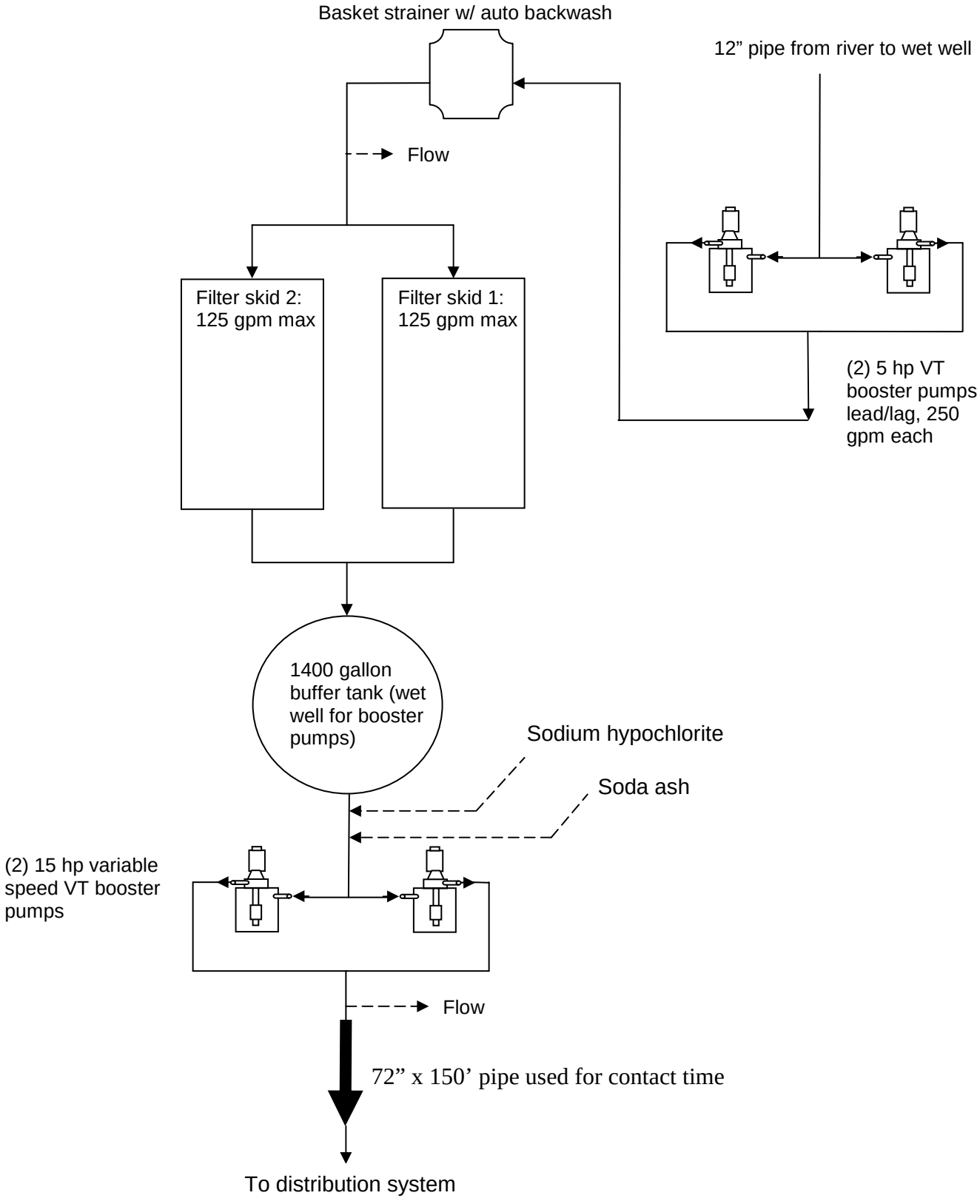

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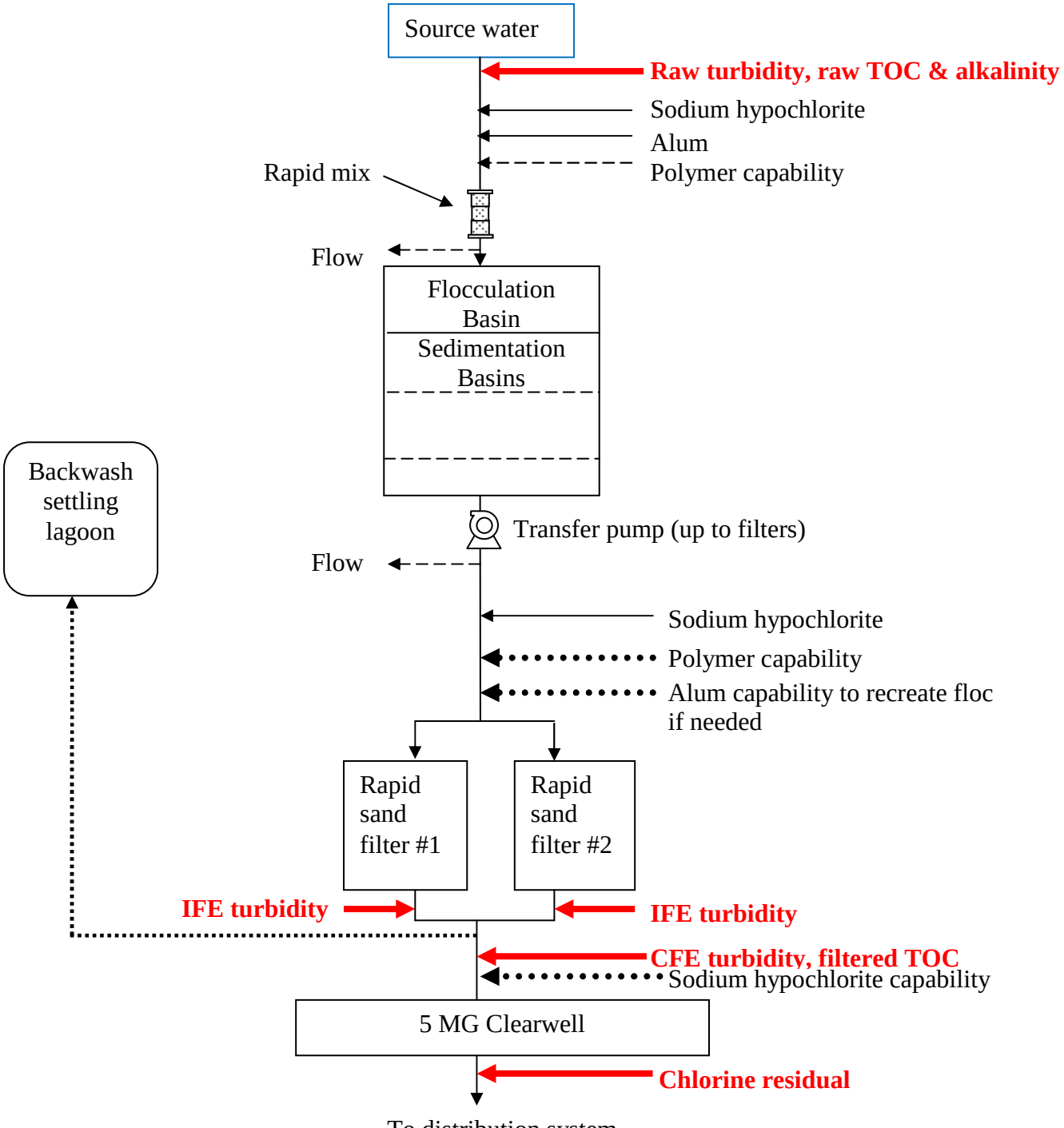

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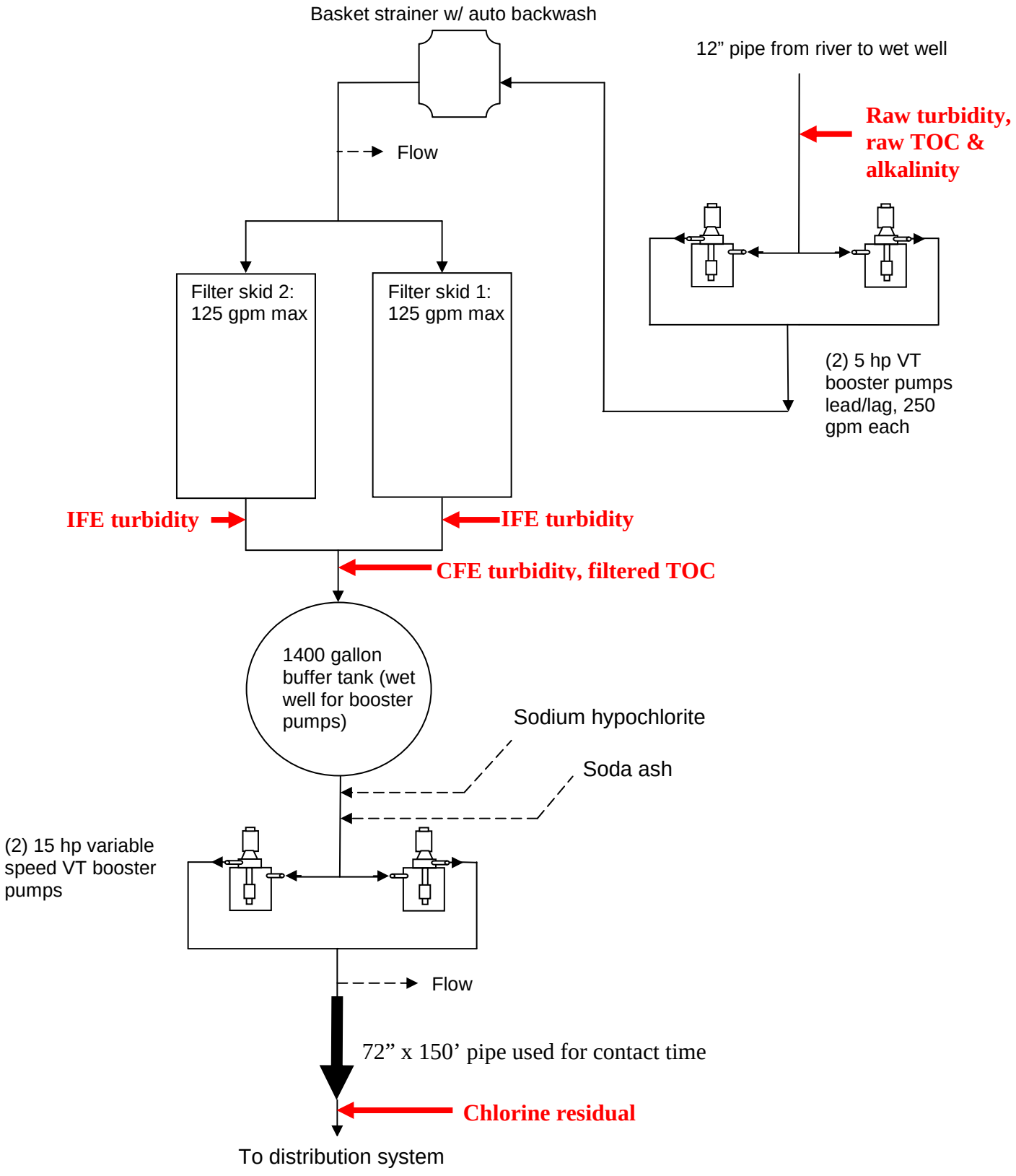


ESSENTIALS OF SURFACE WATER TREATMENT TRAINING

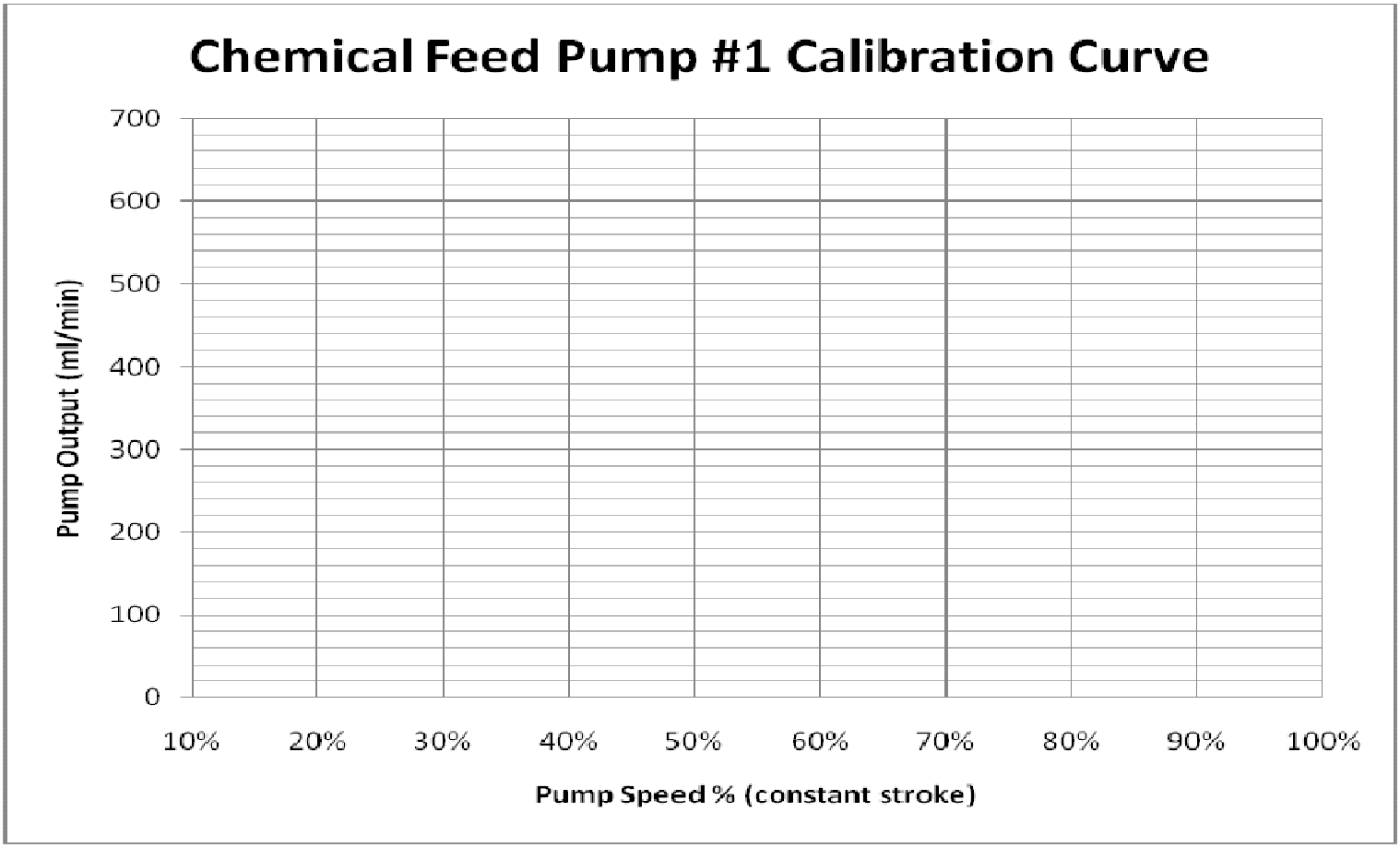
Exercise #3: Creating a chemical feed pump curve

Directions: Use the data provided in the examples below to create a pump curve. Pump curves should be smooth and fairly linear. A bouncing or jagged pump curve indicates the pump needs maintenance. Maintenance needed may include cleaning, diaphragm replacement and/or seal replacement.

Feed pump #1 pump curve data:

Setting	Time	Volume	Flow Rate
% Speed	Minutes	ml	ml/min
10%	3	60	20
20%	3	360	120
30%	3	420	140
40%	3	810	270
50%	3	900	300
60%	1	450	450
70%	1	400	400
80%	1	525	525
90%	1	530	530
100%	1	575	575

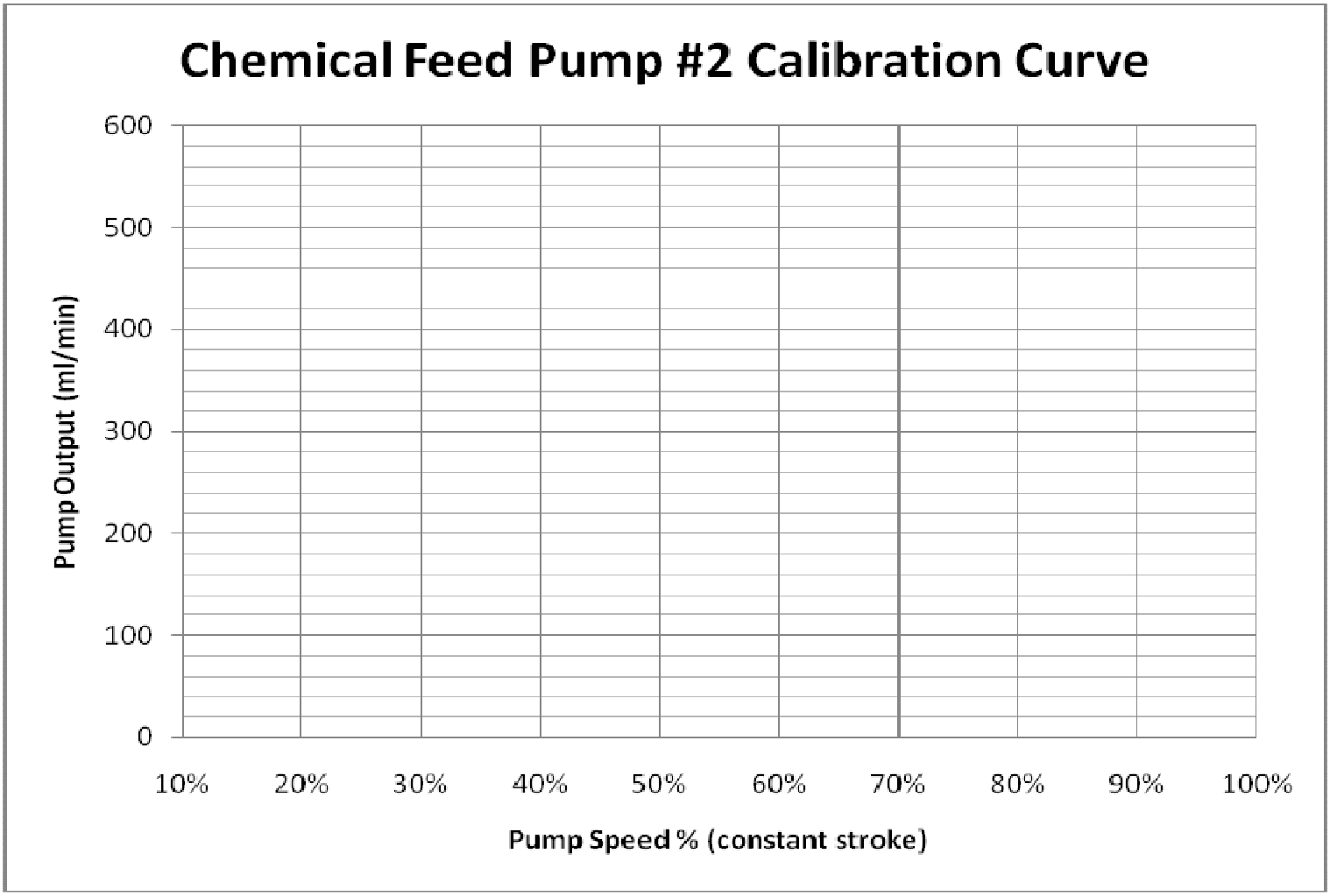
Plot the data points on the graph. Does the pump need maintenance? _____



Feed pump #2 pump curve data:

Setting	Time	Volume	Flow Rate
% Speed	Minutes	ml	ml/min
10%	3	120	40
20%	3	270	90
30%	3	480	160
40%	3	690	230
50%	3	960	320
60%	1	400	400
70%	1	460	460
80%	1	500	500
90%	1	540	540
100%	1	560	560

Plot the data points on the graph. Does the pump need maintenance?_____



Bonus question: Referring to feed pump #2 data above, if you normally have your speed set at 50% in order to maintain 1 ppm of chemical, what speed do you need to change it to if you do a new pump curve and get the following results:

Feed pump #2 *NEW* pump curve data

Setting	**Time**	**Volume**	**Flow Rate**
% Speed	Minutes	ml	ml/min
10%	3	60	20
20%	3	120	40
30%	3	270	90
40%	3	480	160
50%	3	690	230
60%	1	320	320
70%	1	400	400
80%	1	460	460
90%	1	500	500
100%	1	540	540

Answer:_____

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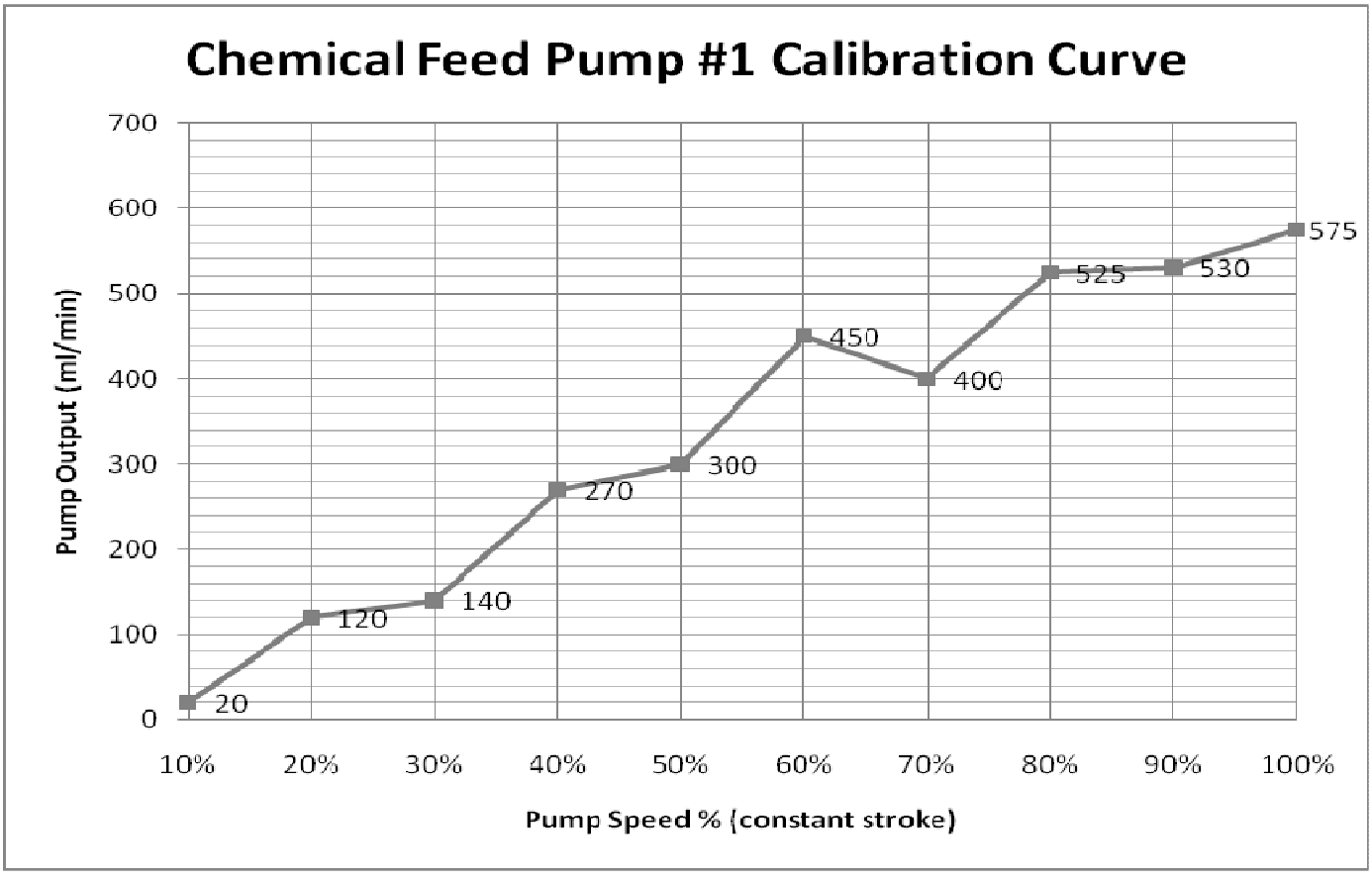
50%	3	900	300
60%	1	450	450
70%	1	400	400
80%	1	525	525
90%	1	530	530
100%	1	575	575

Plot the data points on the graph. Does the pump need maintenance? **Yes (jagged line)**



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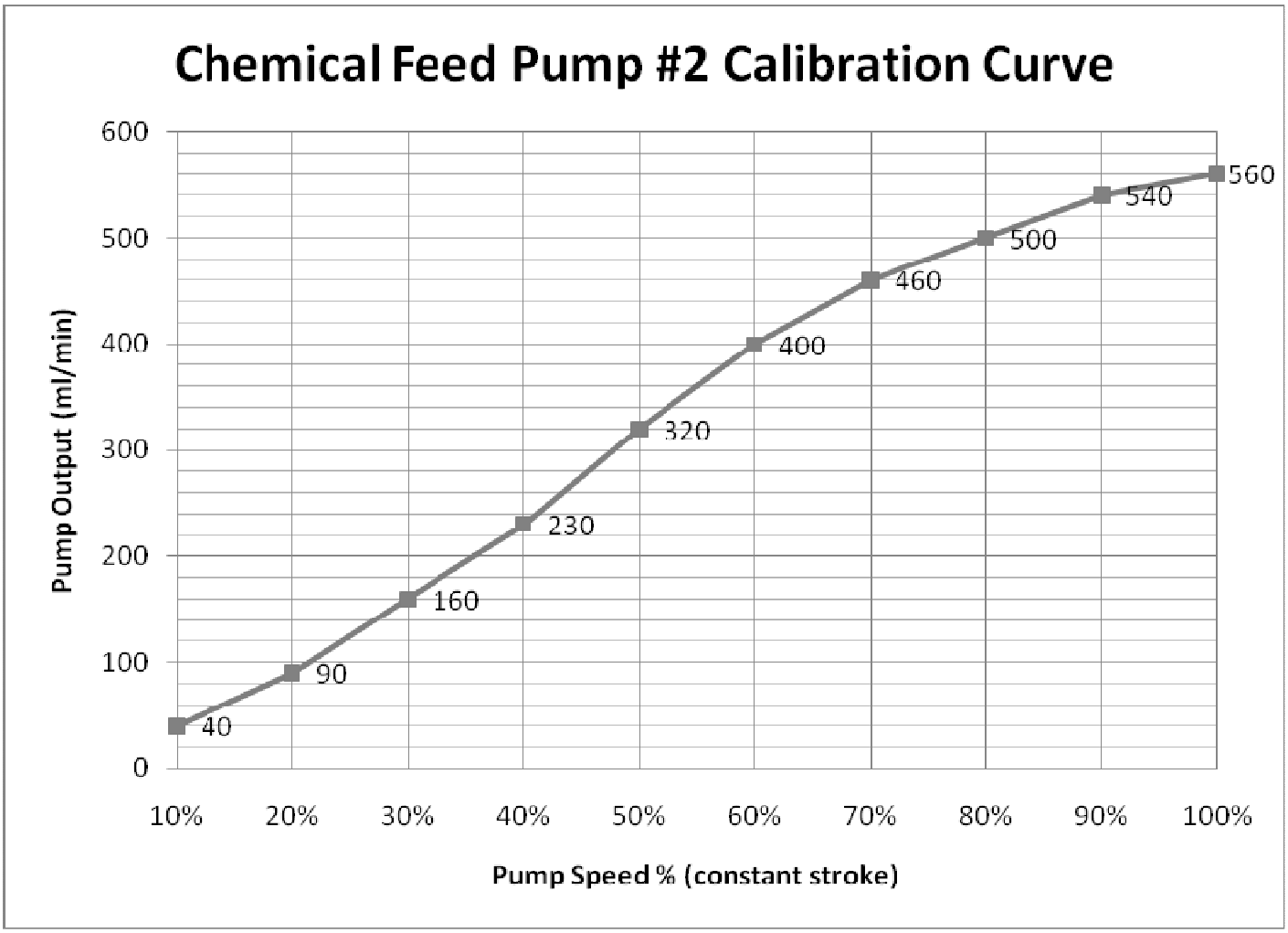
60%	1	400	400
70%	1	460	460
80%	1	500	500
90%	1	540	540
100%	1	560	560

Plot the data points on the graph. Does the pump need maintenance?**No (straight-ish, smooth line)**



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60%	1	320	320
70%	1	400	400
80%	1	460	460
90%	1	500	500
100%	1	540	540

Answer: **60%**