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**From:** Prysby, Mike (DEQ)  
**Sent:** Tuesday, October 20, 2015 2:32 PM  
**To:** Busch, Stephen (DEQ)  
**Subject:** Preliminary and Deliberative: FW: Flint Corrosion Control Plans and MDEQ Preliminary Comments.pdf  
**Attachments:** Flint Phosphate Calculations.pdf; MDEQ Preliminary Comments with replies (2).pdf; IBC tote scale with containment.pdf

Samir's response to our comments...

Michael Prysby, P.E.  
District Engineer  
Office of Drinking Water and Municipal Assistance  
517 290-8817

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**From:** Matta, Samir [<mailto:SFMatta@lan-inc.com>]  
**Sent:** Monday, October 19, 2015 3:11 PM  
**To:** Prysby, Mike (DEQ)  
**Subject:** Flint Corrosion Control Plans and MDEQ Preliminary Comments.pdf

Hi Mike,

Please see attached for your file and use. Let me know if the information satisfy your needs and whether you have additional information that you would like us to have answered.

Thanks.

**Samir F. Matta, PE**  
Team Leader



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& Newnam, Inc.**

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## Flint Phosphate Calculations

Chemical will be 75% NSF certified Phosphoric acid

75% acid has a density of 13.17 #/gal. (5,974 g/gal)  $13.17 \times 453.5923$

Of this 75% is Phosphoric acid ( $\text{H}_3\text{PO}_4$ ) = 4,480 g  $\text{H}_3\text{PO}_4$ /gal  $5,974 \times 0.75$

Molecular weight of  $\text{H}_3\text{PO}_4$  is 97.9913 g/mole

Moles  $\text{H}_3\text{PO}_4$  / gal = 45.72  $4,480 / 97.9913$

Moles  $\text{H}_3\text{PO}_4$  = Moles Orthophosphate ( $\text{PO}_4^{-3}$ ) = Moles Phosphorus (P)

| Species                 | Molecular Wt. | Moles / gal | g/gal   |
|-------------------------|---------------|-------------|---------|
| $\text{H}_3\text{PO}_4$ | 97.9913       | 45.72       | 4,480   |
| $\text{PO}_4^{-3}$      | 94.9676       | 45.72       | 4341.92 |
| P                       | 30.97         | 45.72       | 1407.72 |

### Proposed Operating Parameters

|         | Plant Flow | Dosage as $\text{PO}_4^{-3}$ | Dosage as P* |
|---------|------------|------------------------------|--------------|
| Maximum | 25 MGD     | 1.5 mg/l                     | 0.47 mg/l    |
| Average | 16 MGD     | 0.8 mg/l                     | 0.25 mg/l    |
| Minimum | 4 MGD      | 0.4 mg/l                     | 0.13 mg/l    |

\*Equivalent dosage to  $\text{PO}_4^{-3}$  dosage

### Feed Rate Calculations

Maximum feed rate ( Max Flow  $\times$  Max Dosage)

$$25 \text{ MGD} \times 3782 \text{ g/gal H}_2\text{O} \times 1.5 \text{ ppm} / 4,341.92 \text{ g/gal} = 32.66 \text{ gpd Phosphoric Acid}$$

Average feed rate (Avg Flow  $\times$  Avg Dosage)

$$16 \text{ MGD} \times 3782 \text{ g/gal H}_2\text{O} \times 0.8 \text{ ppm} / 4,341.92 \text{ g/gal} = 11.15 \text{ gpd Phosphoric Acid}$$

Minimum feed rate (Min Flow  $\times$  Min Dosage)

$$4 \text{ MGD} \times 3782 \text{ g/gal H}_2\text{O} \times 0.4 \text{ ppm} / 4,341.92 \text{ g/gal} = 1.39 \text{ gpd Phosphoric Acid}$$