

*Answer Key  
for  
The Inspector's Calc's Exercises*



**Exercise 1: Calculate the Corrosion Rate**

$$CR = \frac{0.400 - 0.260}{2020 - 2000} = \frac{0.14}{20} = 0.007 \text{ ipy}$$

**Exercise 2: Another Corrosion Rate Calculation**

$$CR = \frac{0.750 - 0.675}{2019 - 2004} = \frac{0.075}{15} = 0.005 \text{ ipy}$$

**Exercise 3: Calculate the Corrosion Rate with Mils**

$$CR = \frac{480 - 410}{2019 - 1997} = \frac{70}{22} = 3.2 \text{ mpy}$$

*What is this Corrosion Rate in "ipy"? 0.0032 ipy*

**Exercise 4: Convert Months to Years**

	<i>Date</i>	<i>Month #</i>	<i>Fractional Year</i>	<i>Decimal Year</i>	<i>Total Years</i>
1	April 1998	4 <sup>th</sup>	4/12	0.33	1998.33
2	Feb. 2005	2 <sup>nd</sup>	2/12	0.17	2005.17
3	June 2019	6 <sup>h</sup>	6/12	0.5	2019.5
4	Nov. 2017	11 <sup>th</sup>	11/12	0.92	2017.92

**Exercise 5: Calculate a Corrosion Rate with "Odd" Months**

*Step 1 - Convert the months to years.*

$$\text{September 2020} = 9/12 = 0.75 = 2020.75$$

$$\text{April 2016} = 4/12 = 0.33 = 2016.33$$

*Step 2 - Calc Corrosion Rate*

$$CR = \frac{0.565 - 0.521}{2020.75 - 2016.33} = \frac{0.044}{4.42} = 0.010 \text{ ipy}$$

**Exercise 6: Calculate the Remaining Life**

$$\text{Life} = \frac{0.198 - 0.150}{0.007} = \frac{0.048}{0.007} = 6.9 \text{ yrs}$$

**Exercise 7: Another Remaining Life**

$$Life = \frac{0.211 - 0.150}{0.003} = \frac{0.061}{0.003} = 20.3 \text{ yrs}$$

**Exercise 8: Calculate the Next Inspection Date**

*Step 1 - Calculate the Interval*

$$\begin{aligned} Interval &= \text{Lesser of: } \frac{1}{2} \text{ life or } 10 \text{ years} \\ &= \text{Lesser of: } 14 \times \frac{1}{2} = 7 \text{ years or } 10 \text{ years} \\ &= 7 \text{ years} \end{aligned}$$

*Step 2 - Calculate the Next Inspection Date (NID)*

$$\begin{aligned} NID &= \text{Last Inspection Date} + \text{Interval} \\ &= \text{May 2020} + 7 \text{ years} \\ &= \text{May 2027} \end{aligned}$$

**Exercise 9: Calculate the Next Inspection Date**

	<i>Last Insp Date</i>	<i>Last Insp Date (number)</i>	<i>Remaining Life (yrs)</i>	<i>Inspection Interval (yrs)</i>	<i>Next Insp Date (number)</i>	<i>Convert Partial Yr to Months</i>	<i>Next Insp Date</i>
V-10	April 2020	2020.33	18.7	9.35	2029.68	8.16	Aug 2029
V-20	Feb. 2019	2019.17	17	8.5	2027.67	8.04	Aug 2027
V-30	Sept 2020	2020.75	11.5	5.75	2026.5	6	June 2026
V-40	Nov. 2019	2019.92	20	10	2029.92	11.04	Nov 2029
V-50	May 2020	2020.42	16.4	8.2	2028.62	7.44	July 2028

**Exercise 10: Short & Long-Term Corrosion Rates**

*Step 1 - Calculate Short-Term Corrosion Rate*

$$ST \text{ Rate} = \frac{0.742 - 0.718}{2020 - 2014} = \frac{0.024}{6} = 0.004 \text{ ipy}$$

*Step 2 - Calculate Long-Term Corrosion Rate*

$$LT \text{ Rate} = \frac{0.750 - 0.718}{2020 - 2007} = \frac{0.032}{13} = 0.0025 \text{ ipy}$$

*Step 3 - Pick the Controlling Corrosion Rate (the highest)*

$$0.004 \text{ ipy}$$

*Step 4 - Calculate Remaining Life*

$$Life = \frac{0.718 - 0.640}{0.004 \text{ ipy}} = 19.5 \text{ years}$$

## **Exercise 11: The Monster Calc**

### ***Step 1 - Convert Dates to Numbers***

$$\text{Feb 2020} = 2020-2/12 = 2020.17$$

$$\text{May 2014} = 2014-5/12 = 2014.42$$

$$\text{Nov 2002} = 2002-11/12 = 2002.92$$

### ***Step 2 - Calculate Short-Term Corrosion Rate***

$$\text{ST Rate} = \frac{0.296 - 0.288}{2020.17 - 2014.42} = \frac{0.008}{5.75} = \mathbf{0.0014 \text{ ipy}}$$

### ***Step 3 - Calculate Long-Term Corrosion Rate***

$$\text{LT Rate} = \frac{0.322 - 0.288}{2020.17 - 2002.92} = \frac{0.034}{17.25} = \mathbf{0.002 \text{ ipy}}$$

### ***Step 4 - Pick the Controlling Corrosion Rate (the highest)***

***0.002 ipy***

### ***Step 5 - Calculate Remaining Life***

$$\text{Life} = \frac{0.288 - 0.212}{0.002 \text{ ipy}} = \mathbf{38 \text{ years}}$$

### ***Step 6 - Calculate Inspection Interval***

*Lesser of: ½ life or 10 years*

$$38 \times \frac{1}{2} = 19, \text{ or } 10 \text{ years} = \mathbf{10 \text{ years}}$$

### ***Step 7 - Calculate the Next Inspection Date (NID)***

$$\text{Last Inspection Date} + \text{Interval} = 2020.17 + 10 = \mathbf{2030.17}$$

### ***Step 8 - Convert Partial Year to Month***

$$0.17 \times 12 = 2.04 = \mathbf{\text{February}}$$

### ***Step 9 - Final Answer:***

***February 2030***