

תשתיות נפט ואנרגיה בע"מ

מסוף אלרואי

סיכום פליטות לאוויר שנת 2018

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נספחים

נספח א'	טבלה 1-5.2 (AP-42)
נספח ב'	נתוני ניטור LDAR עבור מסוף אלרואי – סיכום שנת 2018
נספח ג'	דוגמת חישוב עבור מיכל גג חיצוני צף מס' 2 המאחסן קרוסין
נספח ד'	דוגמת חישוב עבור זרוע מילוי עילי טבול מס' 1 של קרוסין
נספח ה'	חישוב פליטות ממיכל לאיסוף תשטיפים

שניר דרור	יואב פיסטינר	25.02.2019	להערות	0
שם עורך	שם מאשר	תאריך	תיאור	גרסה

1. מבוא

חברת תשתיות נפט ואנרגיה בע"מ (להלן תש"מ) מפעילה את מסוף אלרואי לאחסון ושינוע דלקים.

המסוף כולל:

- מבני משרדים
 - חוות מכלים לאחסון דלקים מסוגים שונים
 - רציפי מילוי מכליות כביש (לשימוש בעת חירום בלבד)
- המסוף ממוקם בשוליים הדרום מערביים של קריית טבעון, בצמוד לו וממערב ממוקמת שכונת אלרואי ומדרום לו שכונת קרית חרושת.
- באתר 9 מיכלים, מתוכם 5 מיכלים תפעוליים ו-4 מיכלים אסטרטגים (מיכלים מס' 1, 6, 7 ו-9).
- מערכת השינוע הינה באמצעות משאבות ובקרת מילוי ובנוסף קיימות מערכות תומכות כגון מערכות כיבוי אש ומערכות פיקוד ובקרה.
- כחלק מהתנאים ברישיון עסק מדצמבר 2010, בסוף כל שנה קלנדרית על תש"ן להגיש דו"ח סיכום פליטות שנתי לגבי השנה שחלפה.
- חישובי הפליטות בוצעו בעזרת תוכנת Tanks ומסמכי EPA-AP 42 על פי נתוני המתקנים הקיימים במסוף.
- סיכום הפליטות הוכן על ידי חברת "פז" הנדסה וניהול (1980) בע"מ (להלן פז הנדסה), והוא מבוסס על סקר תהליכים ופליטות לאוויר ודו"חות ניטור LDAR שהוגשו לרשויות.

2. נתוני מסוף

2.1. נתוני מיכלים

בטבלאות הבאות מפורט מידע טכני של המיכלים בחוות המיכלים אלרואי.

טבלה 1: נתוני מיכלים – מידע כללי, מידות ונתוני תפעול – שנת 2018

מספר מיכל	סוג הדלק המאוחסן	לחץ אדים בטמפ' הנוזל הממוצעת (mmHg)	כמות צריכה שנתית (מ"ק)	סוג ניקוז בתחתית מיכל	קוטר מיכל (מטר)	נפח מיכל (מ"ק)	נפח מיכל פעיל (מ"ק)	גובה / אורך מעטפת מיכל (מטר)	גובה נוזל מירבי (מטר)	גובה נוזל ממוצע (מטר)
1 ⁽¹⁾	בנזין	405 @ 28°C	28,206	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	10.5
2	קרוסין	0.833 @ 28°C	37,445	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	10
3	סולר	0.507 @ 28°C	37,035	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	9.5
4	סולר	0.507 @ 28°C	43,547	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	10.3
5	סולר	0.507 @ 28°C	57,578	גבעה מלאה	68.27	56,959	51,614	15.56	14.1	14.1
6 ⁽³⁾	סולר	0.507 @ 28°C	0	גבעה מלאה	68.27	56,959	51,614	15.56	14.1	14.1
7 ⁽³⁾	סולר	0.507 @ 28°C	0	גבעה מלאה	68.27	56,959	51,614	15.56	14.1	11.4
8 ⁽⁴⁾	קרוסין	0.833 @ 28°C	51,102	גבעה חלקית	48.8	36,547	34,228	19.54	18.3	18.3
9 ⁽²⁾	קרוסין	0.833 @ 28°C	28,732	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	9.7
סה"כ			289,645			367,704	332,913			

(1) מכל מס' 1 משמש כמכל מלאי, בחודש פברואר עד אפריל המיכל עבר ריקון ומילוי חומר.

(2) מכל מס' 9 משמש כמכל מלאי, עבר שיפוץ ורק במהלך חודש אוקטובר נובמבר אוחסן חומר במיכל.

(3) מכלים מס' 6 ו-7 משמשים כמכלי מלאי, לא היו תנועות במכלים בשנת 2018.

(4) מכל 8 בשיפוץ מחודש נובמבר.

טבלה 2: נתוני מעטפת וגגות – שנת 2018

מספר מיכל	סוג גג	אטם ראשי	אטם משני	צורת גג	סוג חיבורי גג	צבע גג	מצב צבע גג	צבע מעטפת חיצונית	מצב צבע מעטפת חיצונית	סוג חיבורי מעטפת	מצב מעטפת פנימית	מיכל מחומם
1	גג צף חיצוני	Mechanical Shoe	Rim mounted	Pontoon	מרותך	לבן	טוב	לבן	טוב	מרותך	חלוד הרבה	לא
2	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	חאקי	טוב	מרותך	חלוד הרבה	לא
3	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	צהוב קרם	טוב	מרותך	חלוד הרבה	לא
4	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	חאקי	ישן	מרותך	חלוד הרבה	לא
5	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	צהוב קרם	טוב	מרותך	חלוד הרבה	לא
6	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	צהוב קרם	טוב	מרותך	חלוד הרבה	לא
7	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	צהוב קרם	טוב	מרותך	חלוד הרבה	לא
8	גג צף חיצוני	Liquid mounted	Rim mounted	Pontoon	מרותך	לבן	טוב	כחול בהיר	טוב	מרותך	חלוד הרבה	לא
9	גג צף חיצוני	Mechanical Shoe	Rim mounted	Pontoon	מרותך	לבן	טוב	צהוב קרם	טוב	מרותך	חלוד הרבה	לא

טבלה 3: נתוני אביזרים – שנת 2018

מספר מיכל	שובר ואקום			רגליים מתכווננות התומכות בגג צף			Rim Vent	כמות בוצה בנקיון (מ"ק)	"גרביים" לבאר הדיגום המחורצת ולרגלי הגג הצף
	כמות	Vacuum set. [psi]	Pressure set. [psi]	גובה (ft)	כמות באזור pontoon	כמות במרכז			
1	2	0	0.5	11	43	29	1	70	יש
2	2	0	0.5	11	43	29	1	70	יש
3	2	0	0.5	11	43	29	1	70	יש
4	2	0	0.5	11	43	29	1	70	יש
5	2	0	0.5	11	107	72	1	150	יש
6	2	0	0.5	11	107	72	1	150	יש
7	2	0	0.5	11	107	72	1	150	יש
8	6	0	0.5	9	54	36	1	70	יש
9	2	0	0.5	11	43	29	6	70	יש
סה"כ								870	

הנחות שנלקחו לצורך החישובים

1. עבור חישוב Degassing במיכל עם גג צף – הונח:
 - גג צף נח על רגליים בגובה 9-11 ft (בהתאם לטבלה לעיל) וזהו גם הגובה המרבי של הנוזל במיכל.
 - גובה ממוצע של הנוזל במיכל הינו 50% מגובה הנוזל המרבי.
2. הונח כי ניקיון כללי וריקון של המיכלים מתבצע אחת ל-15 שנים. הניקיון יארך יום אחד.
3. הונח כי אירוע של נחיתת גגות צפים מתבצע אחת ל-15 שנים. זמן נחיתת הגג במקרה זה לא יעלה על 4 ימים.
4. יחס הנוזל בבוצה הונח כ- 0.8 [2]
5. בהתאם לטבלה 7.1-6 על פי [1], נבחרו הצבעים הבאים כמייצגים את צבע מעטפת המיכלים, לצורך חישובי פליטות לאוויר:

טבלה 4: צבעים מייצגים לצורך חישובי אקסל ותוכנת Tanks

צבע מעטפת מיכל	צבע לצורך חישובי אקסל בהתאם למסמך EPA AP-42	צבע לצורך חישובים בתוכנת Tanks (*)
כחול בהיר	Gray Medium	Gray Medium
חאקי	Green Dark	Red/Primer
צהוב קרם	Beige/Cream	Aluminium/Specular

(*) בתוכנת Tanks מבחר הצבעים מצומצם יותר מאשר בטבלה 7.1-6 אשר במסמך EPA AP-42 [1].

2.2. נתונים עבור מסוף מילוי מיכליות כביש

טבלה 5: נתונים עבור מסוף מילוי מיכליות כביש – שנת 2018

מס' זרוע	מוצר	מילוי עילי/ תחת	נפח מילוי שנתי (מ"ק)	נפח ממוצע של מיכלית (מ"ק)
1	קרוסין	עילי טבול	2,066	30
2	קרוסין	עילי טבול	0	30
3	קרוסין	עילי טבול	0	30
4	קרוסין	עילי טבול	0	30
5	קרוסין	עילי טבול	0	30
6	קרוסין	עילי טבול	0	30
7	קרוסין	עילי טבול	0	30
8	קרוסין	עילי טבול	0	30
	סה"כ		2,066	

הנחות שנלקחו צורך החישובים

1. מקדם α (Tank paint solar absorptance) ממוצע עבור קרוסין חושב כדלקמן:

א. בשלב ראשון חושב המקדם α עבור כל אחד ממיכלי הקרוסין:

דוגמת חישוב עבור מיכל מס' 2:

$$\alpha_{\text{tank2}} = \frac{\alpha_{\text{roof(2)}} + \alpha_{\text{Shell(2)}}}{2} = \frac{0.17 + 0.834}{2} = 0.25$$

ב. בשלב השני חושב מקדם α ממוצע עבור הקרוסין:

$$\alpha_{\text{Kerosene}} = \frac{\alpha_{\text{tank(2)}} + \alpha_{\text{tank(8)}} + \alpha_{\text{tank(9)}}}{\text{number of kerosene tanks}} = \frac{0.25 + 0.43 + 0.26}{3} = 0.31$$

2. זמן מילוי מיכלית חושב על פי נפח ממוצע של מיכלית וקצב מילוי שעתי מרבי של 1000 ליטר/דקה.

3. Vapor collection efficiency - 70%

4. Vapor recovery efficiency - 0%

5. Saturation factor הונה כ-0.6 (Submerged loading, dedicated normal service) על פי [1]. טבלה רלוונטית מצורפת בנספח א'.

3. חישוב פליטות

3.1. כללי

חישובי הפליטות עבור מיכלי האחסון בוצעו בתוכנת Tanks ובעזרת EPA-AP 42 [1].
הערכת פליטות כתוצאה מדליפות ציוד ואביזרים (LDAR) מצורפת בנספח ב'.
דוגמת חישוב עבור מיכל גג חיצוני צף (מיכל מס' 2) המאחסן קרוסין, מצורפת בנספח ג' למסמך זה.
דוגמת חישוב עבור זרוע מילוי עילי של קרוסין (זרוע מס' 1) מצורפת בנספח ד' למסמך זה.
בדוגמאות אלה ניתן לראות את נתוני הקלט (כולל הנחות) עליהם התבססו החישובים.

3.2. סוגי פליטות מחושבות

הערכת הפליטות ממיכלי אחסון כוללת [3]:

- פליטות בזמן אחסון (Breathing Losses)
 - פליטות משינויי מפלס (Working Losses)
 - פליטות כתוצאה מניקוי וריקון מיכלים (Degassing Losses)
 - פליטות כתוצאה מנחיתת גגות צפים (Roof Landing Losses)
 - פליטות כתוצאה מהפרשי לחץ (Flash Losses)
 - פליטות בזמן מילוי מיכלים ומיכליות
- בסקר הפליטות חושבו כל הפליטות המפורטות לעיל, למעט פליטות כתוצאה מהפרשי לחץ (Flash Losses).
- פליטות אלה רלוונטיות לשינויי פתאומיים בלחץ הנוזל, נתון הגורם להפרת שיווי המשקל הקיים במיכל (בין גז לנוזל) וכתוצאה מכך נוצר תהליך הבזקה, בו מרכיבים קלים מפאזה הנוזל עוברים לפאזה הגזית. תופעות אלה מתרחשות, בדרך כלל, כאשר נוזל המאוחסן בלחץ נשלח לאחסון במיכל בעל לחץ נמוך יותר [3].
- פליטות אלו הוזנחו כיוון שכל החומרים מוחזקים בתנאים אטמוספריים בכל אחד מהשלבים הנוגעים להובלתם ואחסונם, ולפיכך לא צפויה פליטת אדים כתוצאה מתהליך זה.

3.3. בחירת חומרים בתוכנת Tanks

על פי נתוני MSDS של הדלקים במסוף, נבחרו החומרים הבאים הקיימים בתוכנת Tanks כמייצגים של חומרים אלו:

טבלה 6: חומרים מייצגים בתוכנת Tanks

דלק קיים במסוף	חומר מייצג בתוכנת Tanks
סולר (תחבורה והסקה)	Distillate fuel oil no 2
נפט (קרוסין)	Jet kerosene
בנזין	Gasoline RVP 10

3.4. נתונים מטאורולוגיים

לצורך חישוב הנתונים בתוכנת Tanks הוגדרו נתונים מטאורולוגיים המתאימים למפרץ חיפה על פי מקורות [4].

4. סיכום פליטות לשנת 2018

4.1. מיכלים

סיכום חישובי פליטה עבור כל אחד ממכלי האחסון מפורט בטבלה להלן:

טבלה 7: סיכום פליטות מכלים - שנת 2018

מיכל	חומר	פליטות לאוויר (ק"ג/שנה)
1	בנזין (*)	3,092
2	קרוסין	806
3	סולר	46
4	סולר	839
5	סולר	1,732
6	סולר	1,695
7	סולר	1,695
8	קרוסין (ינואר – אוקטובר)	682
9	קרוסין (אוקטובר-נובמבר)	152
	סה"כ	10,740

(*) מכל מס' 1 – לא אוחסן חומר בחודש פברואר – אפריל במהלך השנה.

4.2. מסוף מילוי מיכליות כביש

להלן טבלת סיכום חישובי פליטות עבור זרועות המילוי.

טבלה 8: סיכום פליטות מסוף מילוי מיכליות כביש - שנת 2018

מס' זרוע	מוצר	מילוי עילי / תחתית	פליטה שנתית (ק"ג/שנה)
1	קרוסין	עילי טבול	7.36
2	קרוסין	עילי טבול	0
3	קרוסין	עילי טבול	0
4	קרוסין	עילי טבול	0
5	קרוסין	עילי טבול	0
6	קרוסין	עילי טבול	0
7	קרוסין	עילי טבול	0
8	קרוסין	עילי טבול	0
סה"כ			7.36

4.3. מיכל איסוף תשטיפים

סך הפליטה ממיכל לאיסוף תשטיפים הינה כ- 1 ק"ג/שנה.

חישוב מצורף בנספח ה'.

יצוין כי החישוב מתבסס על הנחה מחמירה שהמכל מכיל קרוסין בלבד. מעשית, המיכל מכיל בעיקר ניקוז מים מהמכלים.

4.4. סיכום ממצאי ניטור LDAR

טבלה 9: סיכום פליטות חומרים אורגניים נדיפים עבור רכיבים בשנת 2018

סה"כ פליטות (ק"ג/שנה)	
פליטה שנתית (ק"ג/שנה)	סיכום פליטות LDAR
22	סה"כ

4.5. פליטה שנתית מכלל המתקן

טבלה 10: סיכום פליטות שנתי מכלל מסוף אלרואי – שנת 2018

סה"כ פליטות (ק"ג/שנה)				
סה"כ	סיכום פליטות רכיבים (LDAR)	מיכל לאיסוף תשטיפים	מסוף מילוי מיכליות כביש	חוות מיכלים
10,770	22	1	7.36	10,740

5. פליטות לא שגרתיות במהלך שנת 2018

במהלך שנת 2018 לא התרחשו פליטות לא שגרתיות כתוצאה מפעילות הטרימינל.

6. מקורות

[1] EPA-AP42

[2] USER'S GUIDE to TANKS - Storage Tank Emissions Calculation Software Version
4.0 - APPENDIX D

[3] הנחיות הממונה לטיפול בבקשה להיתר פליטה לפי סעיף 9(א) לתקנות אוויר נקי (היתרי פליטה),
התשי"ע – 2010, מהדורה 4, ספטמבר 2014

[4] האטלס האקלימי לתכנון פיסוי וסביבתי בישראל, מהדורה שנייה, 1994

נספח א'

טבלה 1-5.2

AP-42

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

Cargo Carrier	Mode Of Operation	S Factor
Tank trucks and rail tank cars	Submerged loading of a clean cargo tank	0.50
	Submerged loading: dedicated normal service	0.60
	Submerged loading: dedicated vapor balance service	1.00
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.00
Marine vessels ^a	Submerged loading: ships	0.2
	Submerged loading: barges	0.5

^a For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

נספח ב'

נתוני ניטור LDAR עבור אלרואי – סיכום שנת 2018

(מתוך דיווח שהתקבל ממעבדות אקולוגיה מתאריך 03.02.2019)

3013.15-004A

LDAR
Fugitive Emission Monitoring
Report No.
RL-TS-R-A-18

Plant: *TASHAN*
City: *Haifa*
District: *Haifa*
Production Unit: *Alroy*
Group: *Group 1-2-3*
Reporting period: *Annual Summary*

Report printing date: *03-Feb-2019*

Technicians names: *Polik*
Portselan
Tomarov

Report editor: *Michael Ourievsky*

Approved by: *Alexey Ratner, CEO*



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1 Project introduction

1.1 Scope of work

6 rounds of measurements (from 01/01/2018 to 31/12/2018)

Measurements performed for following classes:

- Group 1: PRD, Sampling Point
- Group 2: Open End, Stem Valve
- Group 3: Connection, Flange

1.2 Project phases

-)] Monitoring: Group 1-2-3
-)] Re-measurement after repair action
-)] Revision of equipment and production processes
-)] Inventorisation: adding or deleting components
-)] Mapping of components on P&ID's

General

1. LDAR tests were performed under ISO-17025 accreditation of ISRAC (Israel Laboratory Accreditation Authority).
2. ISRAC is not responsible for the test results.

2 Methodology

1.1 Definitions

Chemical State:

Gas/Vapor: stream which is in process conditions under gaseous or vapor form.

Light Liquid: a liquid having a VOC content greater than 10% (by volume) that evaporates at 150°C

Heavy Liquid: a liquid having a VOC content of 10% or less (by volume) that evaporates at 150°C

Leak definition: 1,000 ppm (all sources)

Difficult to monitor components:

Any component situated at a level higher than five meters above ground level or any component situated at a distance further than two meters from a platform and which cannot be accessed by employees in a safe way.

Any component which access requires the elevation of a person to a level higher than two meters above regular surfaces, and which cannot be accessed in a safe.

Registered sources:

Sources with a leak value equal or greater than 9 ppm.

Default-zero:

This equation is valid for sources with a leak value of 0 ppm. A fixed EPA emission calculation rule is used for all these sources.

Total components:

All of the existing active components.

Total measured components:

All of the components, measured in specific monitoring round.

2.2 Methodology

Formulas:

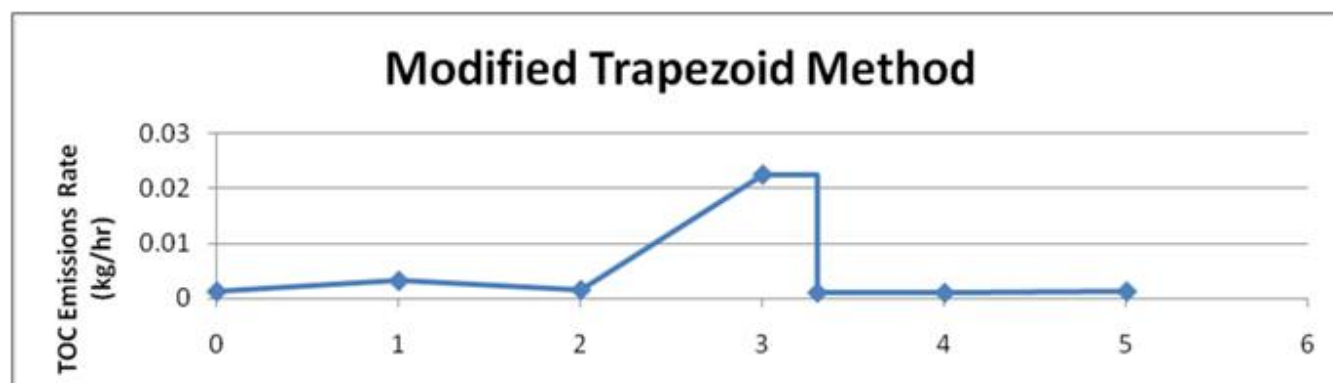
Measured ppm values are converted to emission loss (kg/year) and these calculations are based on the E.P.A. "Correlation method Refinery"

Modified Trapezoidal Emission Calculation Method:

The modified trapezoid method assumes that the mass leak rate changes linearly between any two monitoring points, except for periods between leak detection and repair; the leak monitor reading is used from the time the leak is detected to the time it is repaired (i.e., re-screened).

Cumulative data:

In "Cumulative data" tables we provide the results of all of the measurements that performed from beginning of the year till the end of current monitoring period (quarter). We also calculate the real sum of previous emissions based on the all rounds of the measurements (before and after repairing attempts). (US EPA "Emission Estimation Protocol for Petroleum Refineries")



Equation Set Details Report

<u>Equation Set</u>	<u>Class</u>	<u>Chemical State</u>	<u>Default Zero</u>	<u>Pegged 100k</u>	<u>Multiplier</u>	<u>Exponent</u>	<u>Avg. Factor</u>
Refinery	Connection	Light Liquid	7.5E-06	0.03	1.53E-06	0.735	0.00025
Refinery	Flange	Light Liquid	3.1E-07	0.084	4.61E-06	0.703	0.00025
Refinery	Open End	Light Liquid	2E-06	0.079	2.2E-06	0.704	0.0023
Refinery	PRD	Light Liquid	4E-06	0.11	1.36E-05	0.589	0.16
Refinery	Sampling Point	Light Liquid	4E-06	0.11	1.36E-05	0.589	0.015
Refinery	Stem Valve	Light Liquid	7.8E-06	0.14	2.29E-06	0.746	0.0109

Summary of Period: 01/01/2018-31/12/2018

The total emissions: **22.275kg**

Overview by component class

Component Class	Total Components count	Total Components above leak definition (1,000 ppm)						% of components above leak definition (1,000 ppm)						Unrepaired Components						Total Emissions	
		count						%						count						kg	
		Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	01/01/2018- 31/12/2018	
PRD	4	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	0.548	
Sampling Point	4	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	0.14	
Total Group 1:	8	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	0.688	
Stem Valve	20	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	1.367	
Open End	102	0	0	0	0	1	0	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0	0	0	0	0	0	17.574	
Total Group 2:	122	0	0	0	0	1	0	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0	0	0	0	0	0	18.941	
Flange	55	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	0.149	
Connection	38	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	2.497	
Total Group 3:	93	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	2.646	
Total:	223	0	0	0	0	1	0	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0	0	0	0	0	0	22.275	

Overview by reading range

Reading Range	Total Components											
	Round 1		Round 2		Round 3		Round 4		Round 5		Round 6	
	#	%	#	%	#	%	#	%	#	%	#	%
0-8 ppm	6	75.0%	8	100.0%	183	82.1%	8	100.0%	126	96.9%	8	100.0%
9-999 ppm	2	25.0%	0	0.0%	40	17.9%	0	0.0%	3	2.3%	0	0.0%
1,000-100,000 ppm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.8%	0	0.0%
Above 100,000 ppm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total above 1,000 ppm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.8%	0	0.0%
Difficult to Monitor	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total:	8	100.0%	8	100.0%	223	100.0%	8	100.0%	130	100.0%	8	100.0%

Summary of Monitoring Period Round 1

First measurement:
0 "difficult to monitor" sources.
6 default-zero sources with a calculated emission rate:
2 registered sources with a calculated emission rate:
The total calculated emission rate:

0.21 kg/year
2.886 kg/year
3.096 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	2	0	0.00%	0	2.956
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	2	0	0.00%	0	3.096

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	6	75.00%	0.21	6.78%	
9-999 ppm	2	25.00%	2.886	93.22%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	3.096	100%	

Measurement after repair attempt:
0 "difficult to monitor" sources.
6 default-zero sources with a calculated emission rate:
2 registered sources with a calculated emission rate:
The total calculated emission rate:

0.21 kg/year
2.886 kg/year
3.096 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	2	0	0.00%	0	2.956
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	2	0	0.00%	0	3.096

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	6	75.00%	0.21	6.78%	
9-999 ppm	2	25.00%	2.886	93.22%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	3.096	100%	

Summary of Monitoring Period Round 2

First measurement:

- 0 "difficult to monitor" sources.
8 default-zero sources with a calculated emission rate:
0 registered sources with a calculated emission rate:
The total calculated emission rate:

0.28 kg/year
0 kg/year
0.28 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	0	0	0.00%	0	0.28

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	8	100.00%	0.28	100.00%	
9-999 ppm	0	0.00%	0	0.00%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	0.28	100%	

Measurement after repair attempt:

- 0 "difficult to monitor" sources.
8 default-zero sources with a calculated emission rate:
0 registered sources with a calculated emission rate:
The total calculated emission rate:

0.28 kg/year
0 kg/year
0.28 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	0	0	0.00%	0	0.28

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	8	100.00%	0.28	100.00%	
9-999 ppm	0	0.00%	0	0.00%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	0.28	100%	

Summary of Monitoring Period Round 3

First measurement:
0 "difficult to monitor" sources.
183 default-zero sources with a calculated emission rate:
40 registered sources with a calculated emission rate:
The total calculated emission rate:

5.379 kg/year
25.571 kg/year
30.95 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Stem Valve	20	0	0	0.00%	0	1.367
Open End	102	40	0	0.00%	0	26.658
Flange	55	0	0	0.00%	0	0.149
Connection	38	0	0	0.00%	0	2.497
Total:	223	40	0	0.00%	0	30.951

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	183	82.06%	5.379	17.38%	
9-999 ppm	40	17.94%	25.571	82.62%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	223	100%	30.95	100%	

Measurement after repair attempt:
0 "difficult to monitor" sources.
183 default-zero sources with a calculated emission rate:
40 registered sources with a calculated emission rate:
The total calculated emission rate:

5.379 kg/year
25.571 kg/year
30.95 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Stem Valve	20	0	0	0.00%	0	1.367
Open End	102	40	0	0.00%	0	26.658
Flange	55	0	0	0.00%	0	0.149
Connection	38	0	0	0.00%	0	2.497
Total:	223	40	0	0.00%	0	30.951

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	183	82.06%	5.379	17.38%	
9-999 ppm	40	17.94%	25.571	82.62%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	223	100%	30.95	100%	

Summary of Monitoring Period Round 4

First measurement:

- 0 "difficult to monitor" sources.
- 8 default-zero sources with a calculated emission rate:
- 0 registered sources with a calculated emission rate:

The total calculated emission rate:

0.28 kg/year
0 kg/year
0.28 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	0	0	0.00%	0	0.28

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	8	100.00%	0.28	100.00%	
9-999 ppm	0	0.00%	0	0.00%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	0.28	100%	

Measurement after repair attempt:

- 0 "difficult to monitor" sources.
- 8 default-zero sources with a calculated emission rate:
- 0 registered sources with a calculated emission rate:

The total calculated emission rate:

0.28 kg/year
0 kg/year
0.28 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	0	0	0.00%	0	0.28

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	8	100.00%	0.28	100.00%	
9-999 ppm	0	0.00%	0	0.00%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	0.28	100%	

Summary of Monitoring Period Round 5

First measurement:
0 "difficult to monitor" sources.
126 default-zero sources with a calculated emission rate:
4 registered sources with a calculated emission rate:
The total calculated emission rate:

3.364 kg/year
5.694 kg/year
9.058 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Stem Valve	20	0	0	0.00%	0	1.367
Open End	102	3	1	33.21%	3.008	7.411
Total:	130	3	1	33.21%	3.008	9.058

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	126	96.92%	3.364	37.14%	
9-999 ppm	3	2.31%	2.686	29.65%	
1,000-100,000 ppm	1	0.77%	3.008	33.21%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	1	0.77%	3.008	33.21%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	130	100%	9.058	100%	

Measurement after repair attempt:
0 "difficult to monitor" sources.
126 default-zero sources with a calculated emission rate:
4 registered sources with a calculated emission rate:
The total calculated emission rate:

3.364 kg/year
3.257 kg/year
6.621 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Stem Valve	20	0	0	0.00%	0	1.367
Open End	102	4	0	0.00%	0	4.974
Total:	130	4	0	0.00%	0	6.621

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	126	96.92%	3.364	50.81%	
9-999 ppm	4	3.08%	3.257	49.19%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	130	100%	6.621	100%	

Summary of Monitoring Period Round 6

First measurement:

- 0 "difficult to monitor" sources.
8 default-zero sources with a calculated emission rate:
0 registered sources with a calculated emission rate:
The total calculated emission rate:

0.28 kg/year
0 kg/year
0.28 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	0	0	0.00%	0	0.28

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	8	100.00%	0.28	100.00%	
9-999 ppm	0	0.00%	0	0.00%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	0.28	100%	

Measurement after repair attempt:

- 0 "difficult to monitor" sources.
8 default-zero sources with a calculated emission rate:
0 registered sources with a calculated emission rate:
The total calculated emission rate:

0.28 kg/year
0 kg/year
0.28 kg/year

Overview by component class

Component Class	Total components count	Components 9-999ppm count	Components above leak definition (1,000 ppm) count	% emission rate of components above leak definition %	Emission rate of components above leak definition kg/year	Total annual emission rate (all components) kg/year
PRD	4	0	0	0.00%	0	0.14
Sampling Point	4	0	0	0.00%	0	0.14
Total:	8	0	0	0.00%	0	0.28

Overview by reading range

Reading Range	Total components count	Percentage of Total Components %	Annual Emission Rate kg/year	Percentage of Total Annual Emission Rate %	Comments
0-8 ppm	8	100.00%	0.28	100.00%	
9-999 ppm	0	0.00%	0	0.00%	
1,000-100,000 ppm	0	0.00%	0	0.00%	
Above 100,000 ppm	0	0.00%	0	0.00%	
Total above 1,000 ppm	0	0.00%	0	0.00%	
Difficult to Monitor	0	0.00%	0	0.00%	
Total:	8	100%	0.28	100%	

Cumulative data for period 01/01/2018-31/12/2018

Form 07: component classification and emission estimations

Correlation Equation Chemical Summary by Component Class

Form 15: LDAR report for production facilities

[illegible]

Chemical Summary by Component Class

Report Chemical Summary Cumulative

Calculation Period: 01/01/2018- 31/12/2018

Equation Set: Refinery

Units of Measurement: KG

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.0548
PRD	BENZENE	71432	0.0055
	CYCLOHEXANE	110827	0.0274
	METHYL TERT-BUTYL ETHER	1634044	0.0548
	n-Octane	111-65-9	0.2192
	TOLUENE	108883	0.1863
			0.548
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.1367
Stem Valve	BENZENE	71432	0.0137
	CYCLOHEXANE	110827	0.0683
	METHYL TERT-BUTYL ETHER	1634044	0.1367
	n-Octane	111-65-9	0.5466
	TOLUENE	108883	0.4646
			1.3666
Component Class:	1-Butene		1.7574
Open End	BENZENE	71432	0.1757
	CYCLOHEXANE	110827	0.8787
	METHYL TERT-BUTYL ETHER	1634044	1.7574
	n-Octane	111-65-9	7.0294
	TOLUENE	108883	5.975
			17.5736

Chemical Summary by Component Class

Report Chemical Summary Cumulative Calculation Period: 01/01/2018- 31/12/2018

Equation Set: Refinery
Units of Measurement: KG

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.0149
Flange	BENZENE	71432	0.0015
	CYCLOHEXANE	110827	0.0075
	METHYL TERT-BUTYL ETHER	1634044	0.0149
	n-Octane	111-65-9	0.0597
	TOLUENE	108883	0.0508
			0.1493
Component Class:	1-Butene		0.2497
Connection	BENZENE	71432	0.025
	CYCLOHEXANE	110827	0.1248
	METHYL TERT-BUTYL ETHER	1634044	0.2497
	n-Octane	111-65-9	0.9986
	TOLUENE	108883	0.8488
			2.4966
Component Class:	1-Butene		2.2275
All	BENZENE	71432	0.2228
	CYCLOHEXANE	110827	1.1137
	METHYL TERT-BUTYL ETHER	1634044	2.2275
	n-Octane	111-65-9	8.9096
	TOLUENE	108883	7.5732
			22.2743
Grand Total			22.2743

LDAR report for production facilities

Plant	Unit	Monitoring Round	Technicians	Remarks
TASHAN	Alroy	Round 1-2-3-4-5-6		

Unit	Drawing	Component Tag	Component Type	Component Class	Location Description	ppm value, First Measurement	Date of First Measurement	Repair Due	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt
Alroy	6006-100-007	75	Blind Flange	Open End	Top of T-1	1,305	29-Nov-2018	08-Dec-2018	29-Nov-2018	Tightening	29-Nov-2018	123				

Round 1
First measurement.
Measurement after repair attempt.

Form 07: component classification and emission estimations

Correlation Equation Chemical Summary by Component Class

Form 15: LDAR report for production facilities

Fugitive emission component classification and emission estimation for production facilities

TASHAN Alroy									Company name Production Unit		Round 1 First measurement			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group		
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count					
6											GV	PRD	G1		
6	0.0%	2.956	0	0	2	2	0	0	1	4	LL				
6											HL				
6											GV	Sampling Point			
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL				
6											HL				
	0.0%	3.096	0	0	2	6	0	0	1	8	Subtotal G1				
	0.0%	3.096	0	0	2	6	0	0	1	8	8 Total Components				
									3.096 Total Annual Emission Rate						
TASHAN Alroy									Company name Production Unit		Round 1 Measurement after repair attempt			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group		
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count					
6											GV	PRD	G1		
6	0.0%	2.956	0	0	2	2	0	0	1	4	LL				
6											HL				
6											GV	Sampling Point			
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL				
6											HL				
	0.0%	3.096	0	0	2	6	0	0	1	8	Subtotal G1				
	0.0%	3.096	0	0	2	6	0	0	1	8	8 Total Components				
									3.096 Total Annual Emission Rate						

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.2956
PRD	BENZENE	71432	0.0296
	CYCLOHEXANE	110827	0.1478
	METHYL TERT-BUTYL ETHER	1634044	0.2956
	n-Octane	111-65-9	1.1824
	TOLUENE	108883	1.005
			2.956
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.3096
All	BENZENE	71432	0.031
	CYCLOHEXANE	110827	0.1548
	METHYL TERT-BUTYL ETHER	1634044	0.3096
	n-Octane	111-65-9	1.2385
	TOLUENE	108883	1.0527
			3.0962
Grand Total			3.0962

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.2956
PRD	BENZENE	71432	0.0296
	CYCLOHEXANE	110827	0.1478
	METHYL TERT-BUTYL ETHER	1634044	0.2956
	n-Octane	111-65-9	1.1824
	TOLUENE	108883	1.005
			2.956
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.3096
All	BENZENE	71432	0.031
	CYCLOHEXANE	110827	0.1548
	METHYL TERT-BUTYL ETHER	1634044	0.3096
	n-Octane	111-65-9	1.2385
	TOLUENE	108883	1.0527
			3.0962
Grand Total			3.0962

LDAR report for production facilities

Plant	Unit	Monitoring Round	Technicians	Remarks
TASHAN	Alroy	Round 1		

Unit	Drawing	Component Tag	Component Type	Component Class	Location Description	ppm value, First Measurement	Date of First Measurement	Repair Due	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt

Round 2
First measurement.
Measurement after repair attempt.

Form 07: component classification and emission estimations

Correlation Equation Chemical Summary by Component Class

Form 15: LDAR report for production facilities

Fugitive emission component classification and emission estimation for production facilities

TASHAN Alroy									Company name Production Unit		Round 2 First measurement			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group		
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count					
6											GV	PRD	G1		
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL				
6											HL				
6											GV	Sampling Point			
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL				
6											HL				
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1				
	0.0%	0.28	0	0	0	8	0	0	1	8	8 Total Components				
										0.28 Total Annual Emission Rate					
TASHAN Alroy									Company name Production Unit		Round 2 Measurement after repair attempt			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group		
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count					
6											GV	PRD	G1		
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL				
6											HL				
6											GV	Sampling Point			
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL				
6											HL				
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1				
	0.0%	0.28	0	0	0	8	0	0	1	8	8 Total Components				
										0.28 Total Annual Emission Rate					

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1

Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.028
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.014
	METHYL TERT-BUTYL ETHER	1634044	0.028
	n-Octane	111-65-9	0.1122
	TOLUENE	108883	0.0954
			0.2804
Grand Total			0.2804

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.028
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.014
	METHYL TERT-BUTYL ETHER	1634044	0.028
	n-Octane	111-65-9	0.1122
	TOLUENE	108883	0.0954
			0.2804
Grand Total			0.2804

LDAR report for production facilities

Plant	Unit	Monitoring Round	Technicians	Remarks
TASHAN	Alroy	Round 2		

Unit	Drawing	Component Tag	Component Type	Component Class	Location Description	ppm value, First Measurement	Date of First Measurement	Repair Due	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt

Round 3

First measurement.

Measurement after repair attempt.

Form 07: component classification and emission estimations

Correlation Equation Chemical Summary by Component Class

Form 15: LDAR report for production facilities

Fugitive emission component classification and emission estimation for production facilities

TASHAN Company name									Round 3			Monitoring round		
Alroy Production Unit									First measurement			Component Class	Group	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State			
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count				
6											GV	PRD	G1	
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL			
6											HL			
6											GV	Sampling Point		
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL			
6											HL			
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1			
2											GV	Stem Valve	G2	
2	0.0%	1.367	0	0	0	20	0	0	16	20	LL			
2											HL			
2											GV	Open End		
2	0.0%	26.658	0	0	40	62	0	0	0	102	LL			
2											HL			
	0.0%	28.025	0	0	40	82	0	0	16	122	Subtotal G2			
1											GV	Flange	G3	
1	0.0%	0.149	0	0	0	55	0	0	0	55	LL			
1											HL			
1											GV	Connection		
1	0.0%	2.497	0	0	0	38	0	0	0	38	LL			
1											HL			
	0.0%	2.646	0	0	0	93	0	0	0	93	Subtotal G3			
	0.0%	30.951	0	0	40	183	0	0	17	223 Total Components				
									30.951 Total Annual Emission Rate					
TASHAN Company name									Round 3			Monitoring round		
Alroy Production Unit									Measurement after repair attempt			Component Class	Group	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State			
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count				
6											GV	PRD	G1	
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL			
6											HL			
6											GV	Sampling Point		
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL			
6											HL			
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1			
2											GV	Stem Valve	G2	
2	0.0%	1.367	0	0	0	20	0	0	16	20	LL			
2											HL			
2											GV	Open End		
2	0.0%	26.658	0	0	40	62	0	0	0	102	LL			
2											HL			
	0.0%	28.025	0	0	40	82	0	0	16	122	Subtotal G2			
1											GV	Flange	G3	
1	0.0%	0.149	0	0	0	55	0	0	0	55	LL			
1											HL			
1											GV	Connection		
1	0.0%	2.497	0	0	0	38	0	0	0	38	LL			
1											HL			
	0.0%	2.646	0	0	0	93	0	0	0	93	Subtotal G3			
	0.0%	30.951	0	0	40	183	0	0	17	223 Total Components				
									30.951 Total Annual Emission Rate					

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.1367
Stem Valve	BENZENE	71432	0.0137
	CYCLOHEXANE	110827	0.0683
	METHYL TERT-BUTYL ETHER	1634044	0.1367
	n-Octane	111-65-9	0.5466
	TOLUENE	108883	0.4646
			1.3666
Component Class:	1-Butene		2.6658
Open End	BENZENE	71432	0.2666
	CYCLOHEXANE	110827	1.3329
	METHYL TERT-BUTYL ETHER	1634044	2.6658
	n-Octane	111-65-9	10.6631
	TOLUENE	108883	9.0636
			26.6578

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.0149
Flange	BENZENE	71432	0.0015
	CYCLOHEXANE	110827	0.0075
	METHYL TERT-BUTYL ETHER	1634044	0.0149
	n-Octane	111-65-9	0.0597
	TOLUENE	108883	0.0508
			0.1493
Component Class:	1-Butene		0.2497
Connection	BENZENE	71432	0.025
	CYCLOHEXANE	110827	0.1248
	METHYL TERT-BUTYL ETHER	1634044	0.2497
	n-Octane	111-65-9	0.9986
	TOLUENE	108883	0.8488
			2.4966
Component Class:	1-Butene		3.0951
All	BENZENE	71432	0.3096
	CYCLOHEXANE	110827	1.5475
	METHYL TERT-BUTYL ETHER	1634044	3.0951
	n-Octane	111-65-9	12.3802
	TOLUENE	108883	10.5232
			30.9507
Grand Total			30.9507

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.1367
Stem Valve	BENZENE	71432	0.0137
	CYCLOHEXANE	110827	0.0683
	METHYL TERT-BUTYL ETHER	1634044	0.1367
	n-Octane	111-65-9	0.5466
	TOLUENE	108883	0.4646
			1.3666
Component Class:	1-Butene		2.6658
Open End	BENZENE	71432	0.2666
	CYCLOHEXANE	110827	1.3329
	METHYL TERT-BUTYL ETHER	1634044	2.6658
	n-Octane	111-65-9	10.6631
	TOLUENE	108883	9.0636
			26.6578

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.0149
Flange	BENZENE	71432	0.0015
	CYCLOHEXANE	110827	0.0075
	METHYL TERT-BUTYL ETHER	1634044	0.0149
	n-Octane	111-65-9	0.0597
	TOLUENE	108883	0.0508
			0.1493
Component Class:	1-Butene		0.2497
Connection	BENZENE	71432	0.025
	CYCLOHEXANE	110827	0.1248
	METHYL TERT-BUTYL ETHER	1634044	0.2497
	n-Octane	111-65-9	0.9986
	TOLUENE	108883	0.8488
			2.4966
Component Class:	1-Butene		3.0951
All	BENZENE	71432	0.3096
	CYCLOHEXANE	110827	1.5475
	METHYL TERT-BUTYL ETHER	1634044	3.0951
	n-Octane	111-65-9	12.3802
	TOLUENE	108883	10.5232
			30.9507
Grand Total			30.9507

LDAR report for production facilities

Plant	Unit	Monitoring Round	Technicians	Remarks
TASHAN	Alroy	Round 3		

Unit	Drawing	Component Tag	Component Type	Component Class	Location Description	ppm value, First Measurement	Date of First Measurement	Repair Due	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt

Round 4

First measurement.

Measurement after repair attempt.

Form 07: component classification and emission estimations

Correlation Equation Chemical Summary by Component Class

Form 15: LDAR report for production facilities

Fugitive emission component classification and emission estimation for production facilities

TASHAN Company name Alroy Production Unit									Round 4 First measurement			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count			
6											GV	PRD	G1
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.28	0	0	0	8	0	0	1	8	8 Total Components		
											0.28 Total Annual Emission Rate		
TASHAN Company name Alroy Production Unit									Round 4 Measurement after repair attempt			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count			
6											GV	PRD	G1
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.28	0	0	0	8	0	0	1	8	8 Total Components		
											0.28 Total Annual Emission Rate		

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.028
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.014
	METHYL TERT-BUTYL ETHER	1634044	0.028
	n-Octane	111-65-9	0.1122
	TOLUENE	108883	0.0954
			0.2804
Grand Total			0.2804

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.028
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.014
	METHYL TERT-BUTYL ETHER	1634044	0.028
	n-Octane	111-65-9	0.1122
	TOLUENE	108883	0.0954
			0.2804
Grand Total			0.2804

LDAR report for production facilities

Plant	Unit	Monitoring Round	Technicians	Remarks
TASHAN	Alroy	Round 4		

Unit	Drawing	Component Tag	Component Type	Component Class	Location Description	ppm value, First Measurement	Date of First Measurement	Repair Due	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt

Round 5
First measurement.
Measurement after repair attempt.

Form 07: component classification and emission estimations

Correlation Equation Chemical Summary by Component Class

Form 15: LDAR report for production facilities

Fugitive emission component classification and emission estimation for production facilities

TASHAN Alroy									Company name Production Unit		Round 5 First measurement			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group		
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count					
6											GV	PRD	G1		
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL				
6											HL				
6											GV	Sampling Point			
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL				
6											HL				
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1				
2											GV	Stem Valve	G2		
2	0.0%	1.367	0	0	0	20	0	0	16	20	LL				
2											HL				
2											GV	Open End			
2	1.0%	7.411	0	1	3	98	1	0	0	102	LL				
2											HL				
	0.8%	8.778	0	1	3	118	1	0	16	122	Subtotal G2				
	0.8%	9.058	0	1	3	126	1	0	17	130	Total Components				
											9.058	Total Annual Emission Rate			
TASHAN Alroy									Company name Production Unit		Round 5 Measurement after repair attempt			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group		
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count					
6											GV	PRD	G1		
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL				
6											HL				
6											GV	Sampling Point			
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL				
6											HL				
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1				
2											GV	Stem Valve	G2		
2	0.0%	1.367	0	0	0	20	0	0	16	20	LL				
2											HL				
2											GV	Open End			
2	0.0%	4.974	0	0	4	98	0	0	0	102	LL				
2											HL				
	0.0%	6.341	0	0	4	118	0	0	16	122	Subtotal G2				
	0.0%	6.621	0	0	4	126	0	0	17	130	Total Components				
											6.621	Total Annual Emission Rate			

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.1367
Stem Valve	BENZENE	71432	0.0137
	CYCLOHEXANE	110827	0.0683
	METHYL TERT-BUTYL ETHER	1634044	0.1367
	n-Octane	111-65-9	0.5466
	TOLUENE	108883	0.4646
			1.3666
Component Class:	1-Butene		0.7411
Open End	BENZENE	71432	0.0741
	CYCLOHEXANE	110827	0.3706
	METHYL TERT-BUTYL ETHER	1634044	0.7411
	n-Octane	111-65-9	2.9645
	TOLUENE	108883	2.5199
			7.4113

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
<u>Component Class:</u>	1-Butene		0.9058
All	BENZENE	71432	0.0906
	CYCLOHEXANE	110827	0.4529
	METHYL TERT-BUTYL ETHER	1634044	0.9058
	n-Octane	111-65-9	3.6233
	TOLUENE	108883	3.0799
			9.0583

Grand Total **9.0583**

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.1367
Stem Valve	BENZENE	71432	0.0137
	CYCLOHEXANE	110827	0.0683
	METHYL TERT-BUTYL ETHER	1634044	0.1367
	n-Octane	111-65-9	0.5466
	TOLUENE	108883	0.4646
			1.3666
Component Class:	1-Butene		0.4974
Open End	BENZENE	71432	0.0497
	CYCLOHEXANE	110827	0.2487
	METHYL TERT-BUTYL ETHER	1634044	0.4974
	n-Octane	111-65-9	1.9894
	TOLUENE	108883	1.691
			4.9736

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.6621
All	BENZENE	71432	0.0662
	CYCLOHEXANE	110827	0.331
	METHYL TERT-BUTYL ETHER	1634044	0.6621
	n-Octane	111-65-9	2.6482
	TOLUENE	108883	2.251
			6.6206
Grand Total			6.6206

LDAR report for production facilities

Plant	Unit	Monitoring Round	Technicians	Remarks
TASHAN	Alroy	Round 5		

Unit	Drawing	Component Tag	Component Type	Component Class	Location Description	ppm value, First Measurement	Date of First Measurement	Repair Due	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt
Alroy	6006-100-007	75	Blind Flange	Open End	Top of T-1	1,305	29-Nov-2018	08-Dec-2018	29-Nov-2018	Tightening	29-Nov-2018	123				

Round 6

First measurement.

Measurement after repair attempt.

Form 07: component classification and emission estimations

Correlation Equation Chemical Summary by Component Class

Form 15: LDAR report for production facilities

Fugitive emission component classification and emission estimation for production facilities

TASHAN Company name Alroy Production Unit									Round 6 First measurement			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count			
6											GV	PRD	G1
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.28	0	0	0	8	0	0	1	8	8 Total Components		
											0.28 Total Annual Emission Rate		
TASHAN Company name Alroy Production Unit									Round 6 Measurement after repair attempt			Monitoring round	
Monitoring Frequency	Components above Leak Definition	Annual Emission Rate	Components above 100,000 ppm	Components in reading range 1,000-100,000 ppm	Components in reading range 9-999 ppm	Components in reading range 0-8 ppm	Total Components above Leak Definition	Difficult to Monitor	Major Components	Total Components	Chemical State	Component Class	Group
cycles/year	%	kg/year	Count	Count	Count	Count	Count	Count	Count	Count			
6											GV	PRD	G1
6	0.0%	0.14	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.14	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.28	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.28	0	0	0	8	0	0	1	8	8 Total Components		
											0.28 Total Annual Emission Rate		

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.028
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.014
	METHYL TERT-BUTYL ETHER	1634044	0.028
	n-Octane	111-65-9	0.1122
	TOLUENE	108883	0.0954
			0.2804
Grand Total			0.2804

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM
Units of Measurement: KG/year

Report Date: 03.02.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene		0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0561
	TOLUENE	108883	0.0477
			0.1402
Component Class:	1-Butene		0.028
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.014
	METHYL TERT-BUTYL ETHER	1634044	0.028
	n-Octane	111-65-9	0.1122
	TOLUENE	108883	0.0954
			0.2804
Grand Total			0.2804

LDAR report for production facilities

Plant	Unit	Monitoring Round	Technicians	Remarks
TASHAN	Alroy	Round 6		

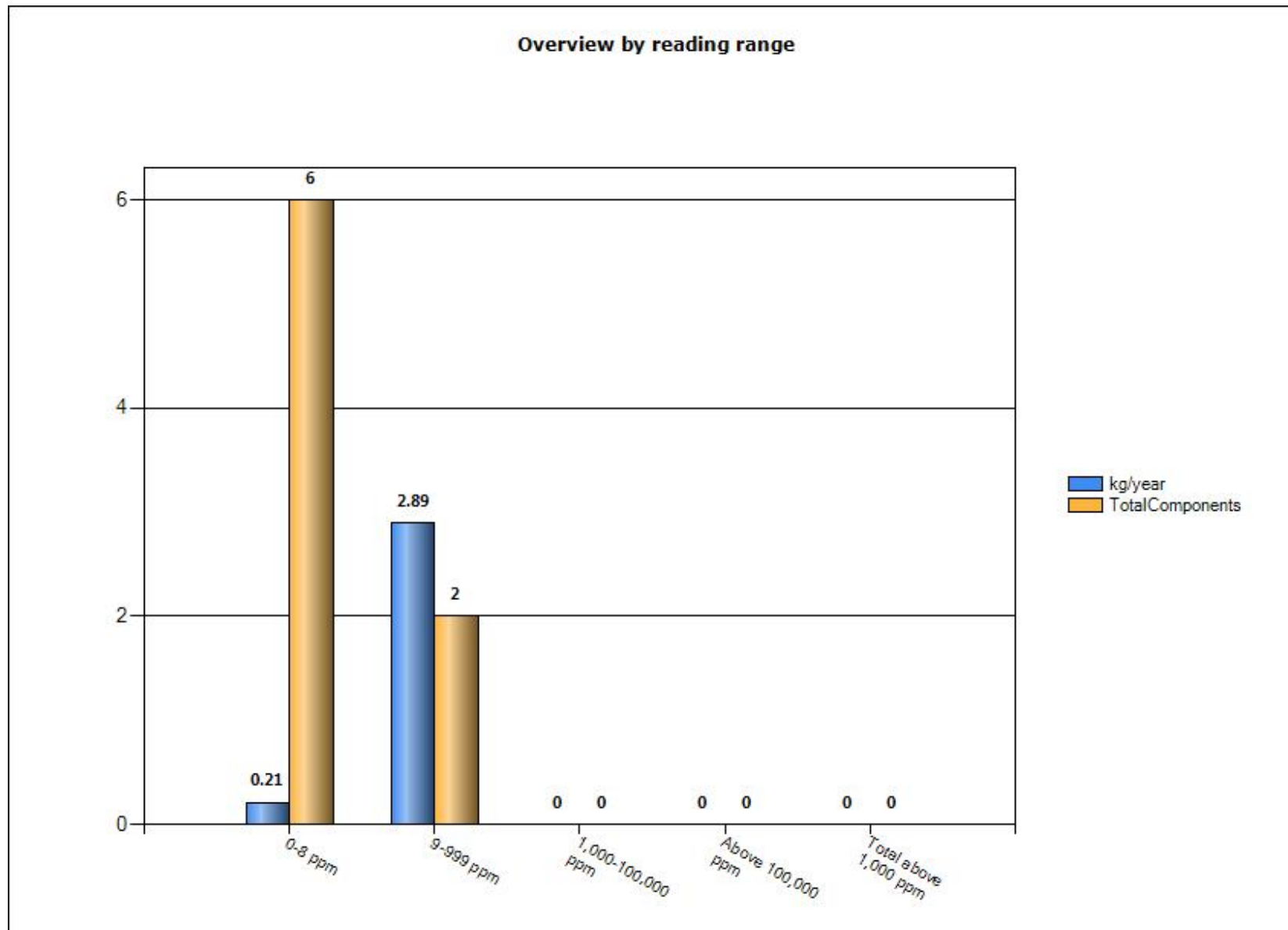
Unit	Drawing	Component Tag	Component Type	Component Class	Location Description	ppm value, First Measurement	Date of First Measurement	Repair Due	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt	Date of repair	Repair type	date of remeasurement after repair attempt	ppm value of remeasurement after repair attempt

Graphs Round 1 First measurement.

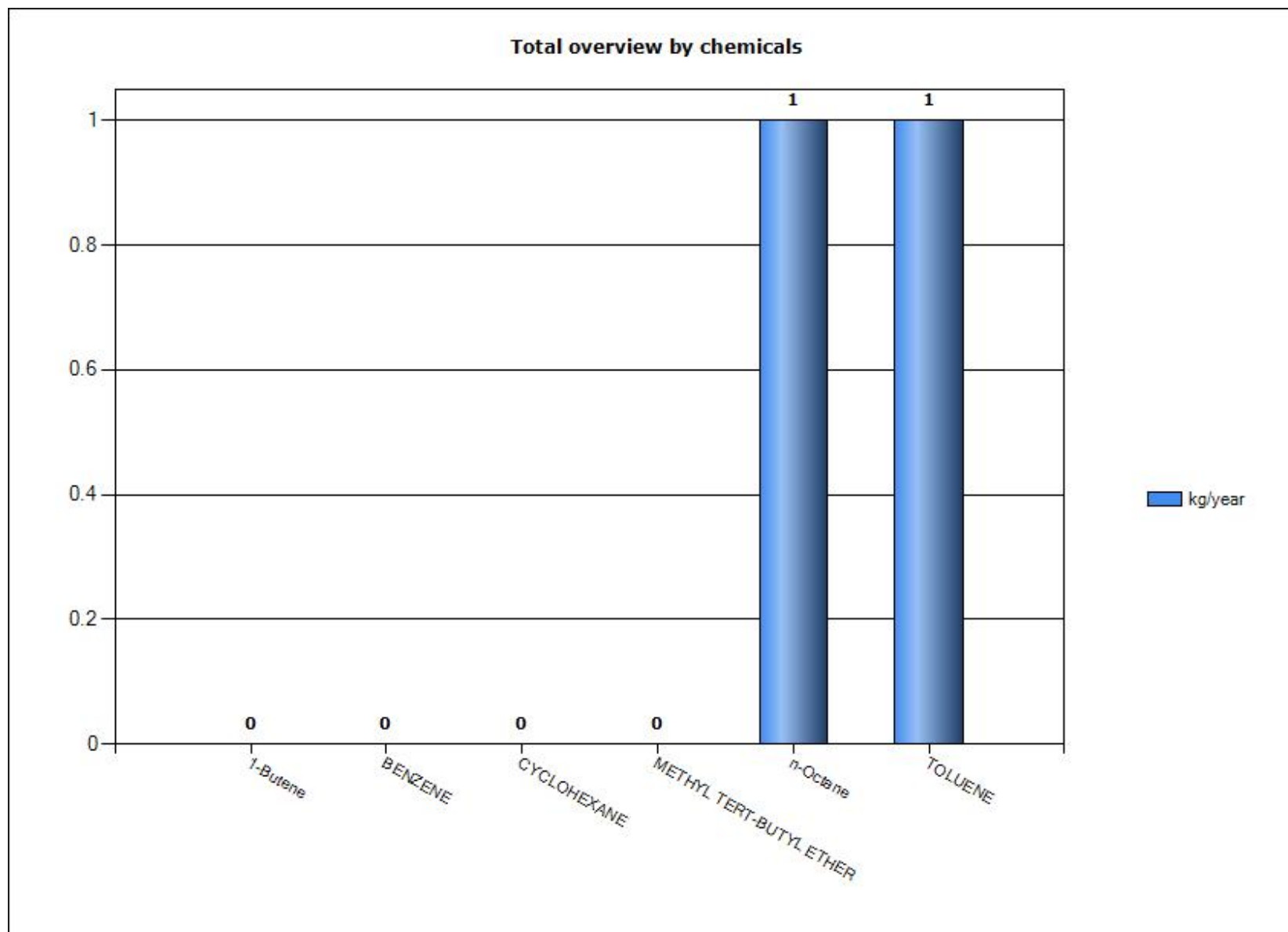
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

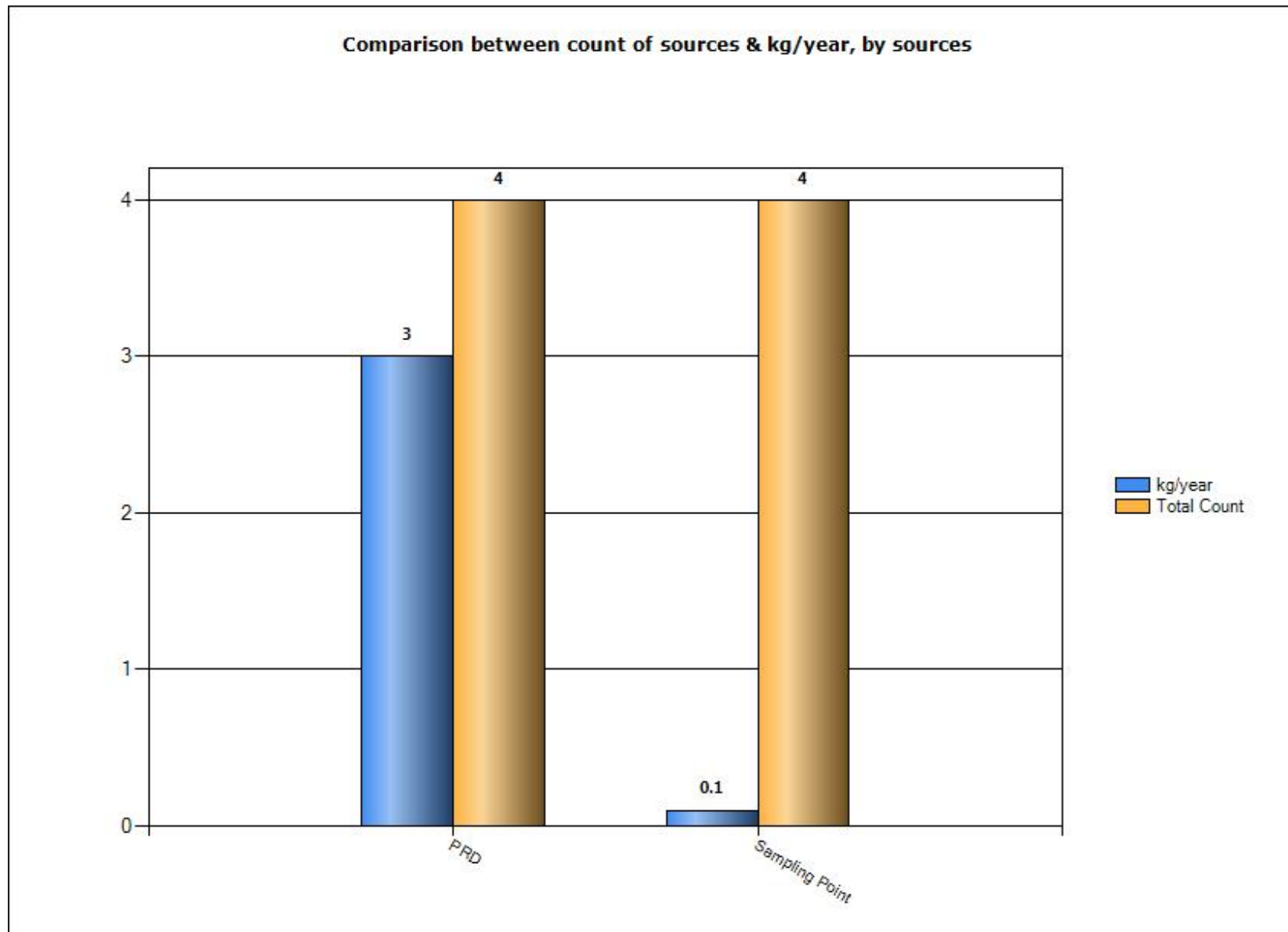
Total overview by chemicals



Graph6.1.1 R1



Graph6.1.3 R1



Graph6.1.2 R1

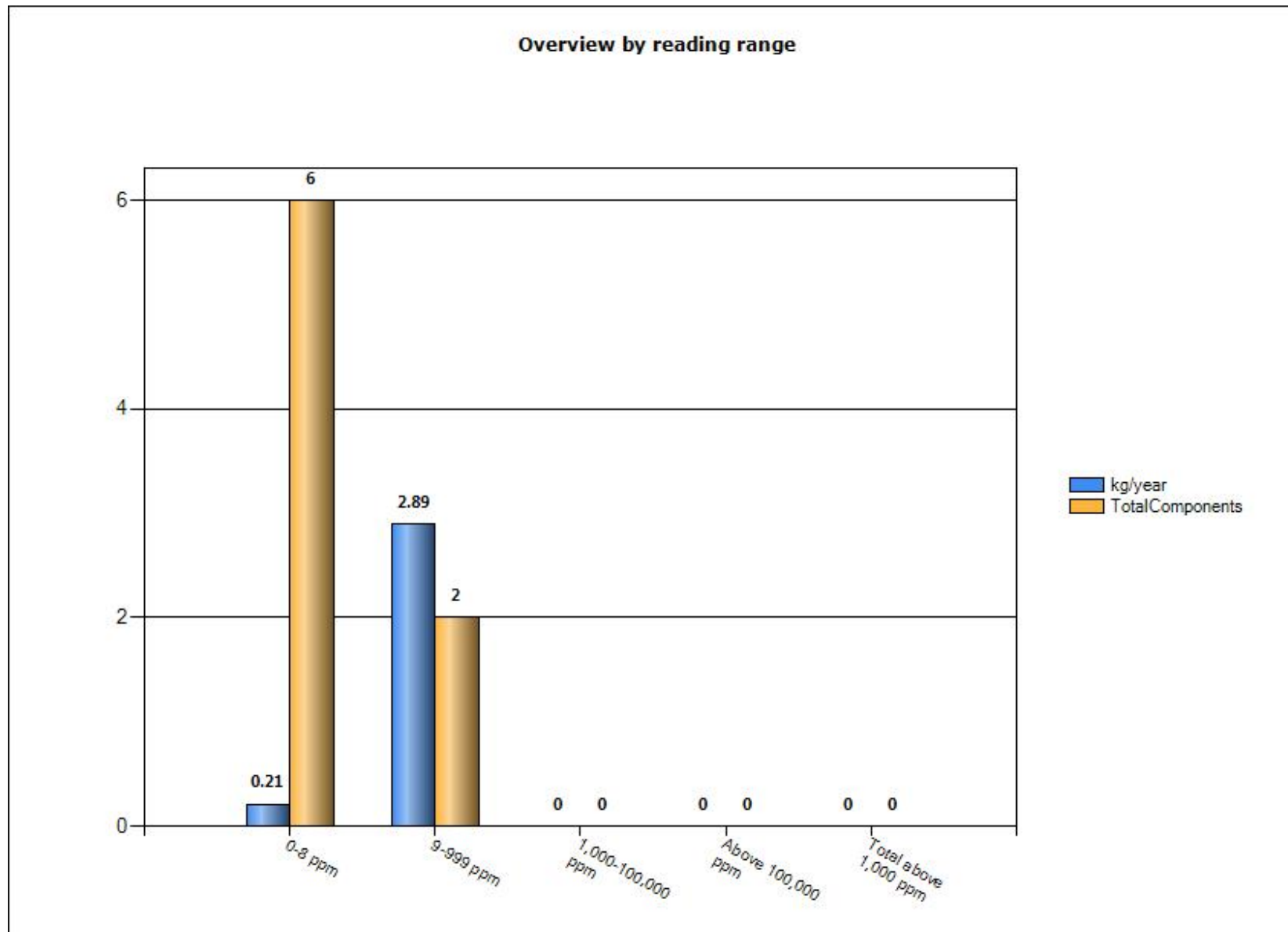
Graphs Round 1

Measurement after repair attempt.

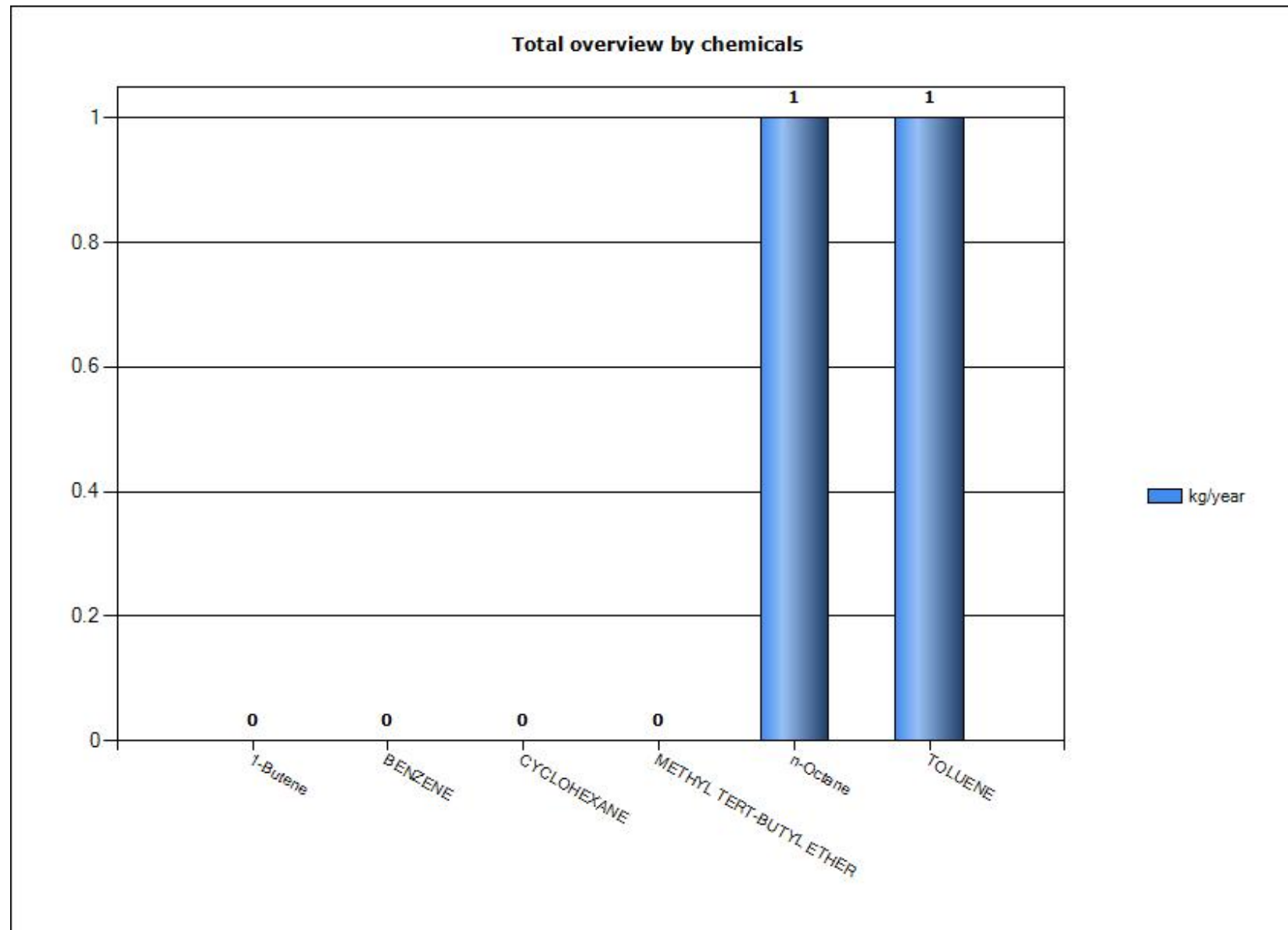
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

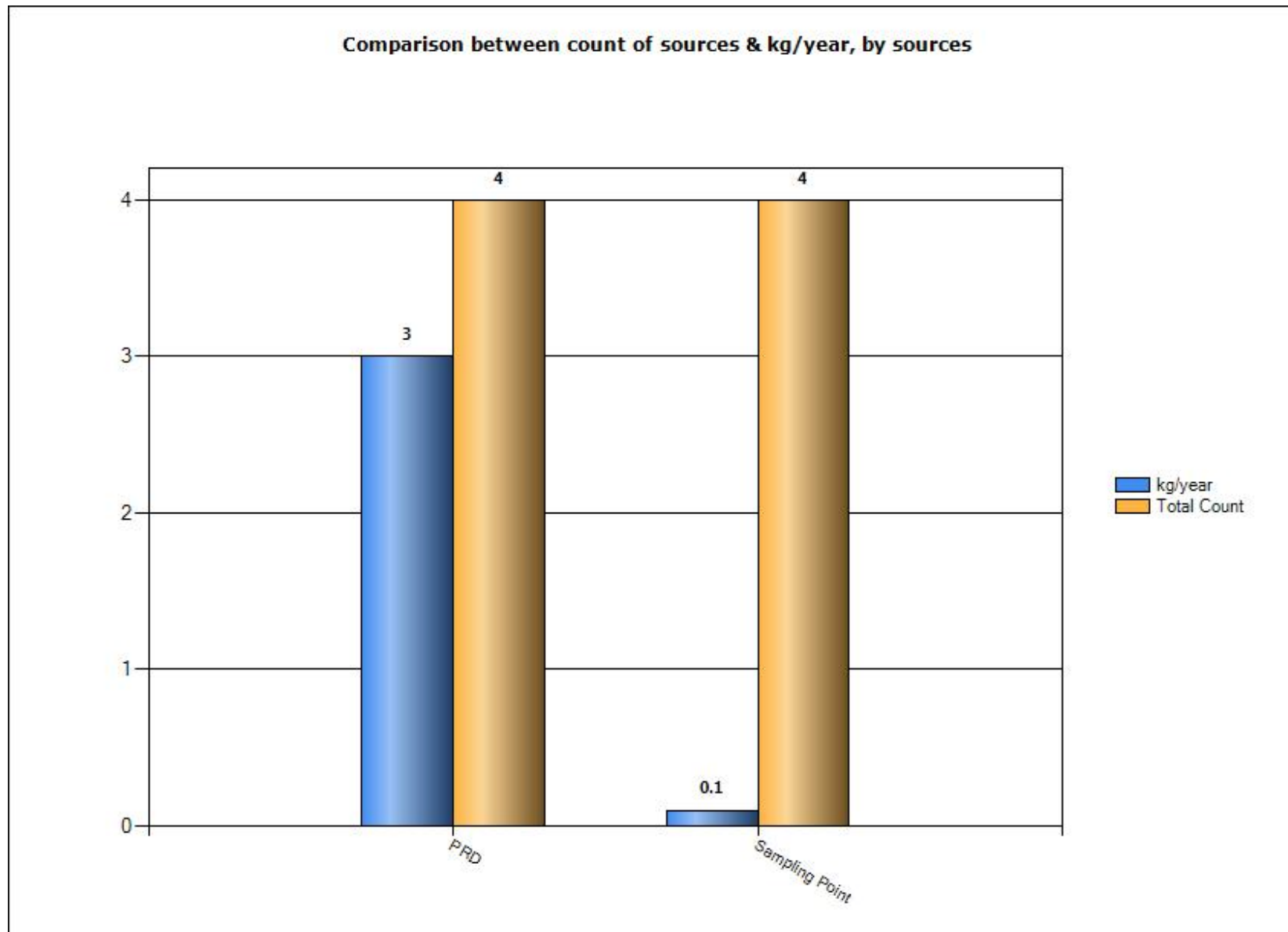
Total overview by chemicals



Graph6.2.1 R1



Graph6.2.3 R1



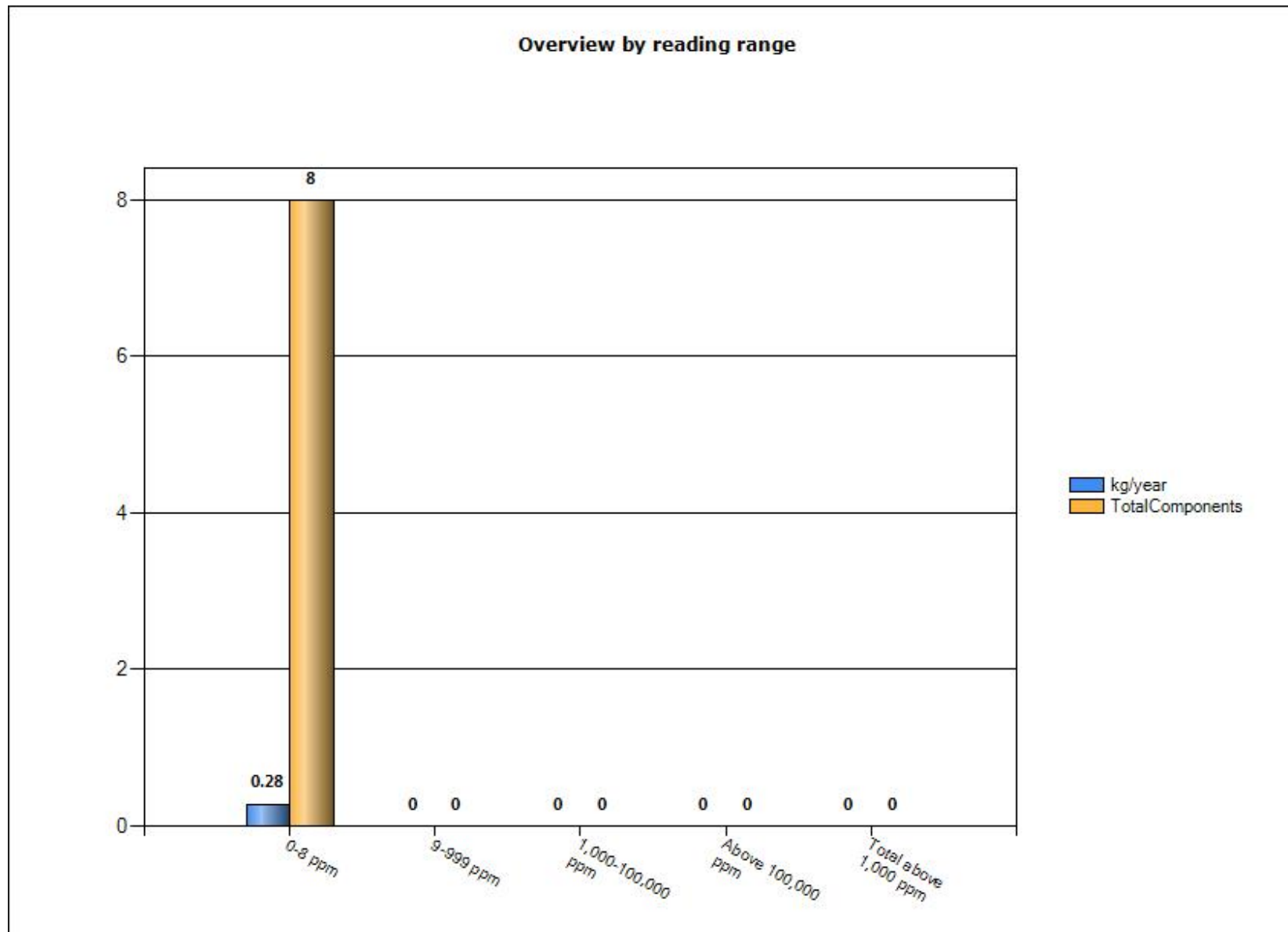
Graph6.2.2 R1

Graphs Round 2 First measurement.

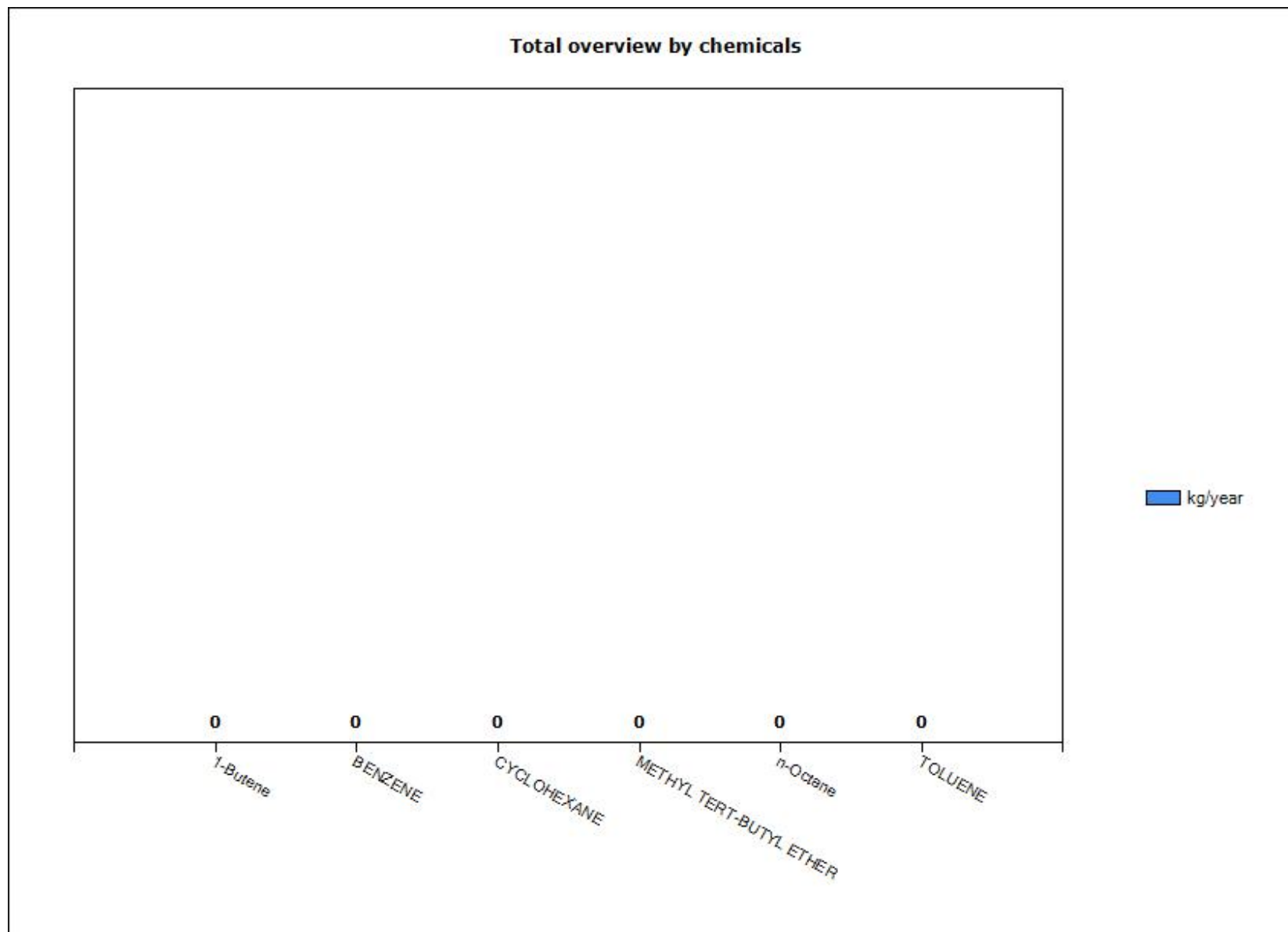
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

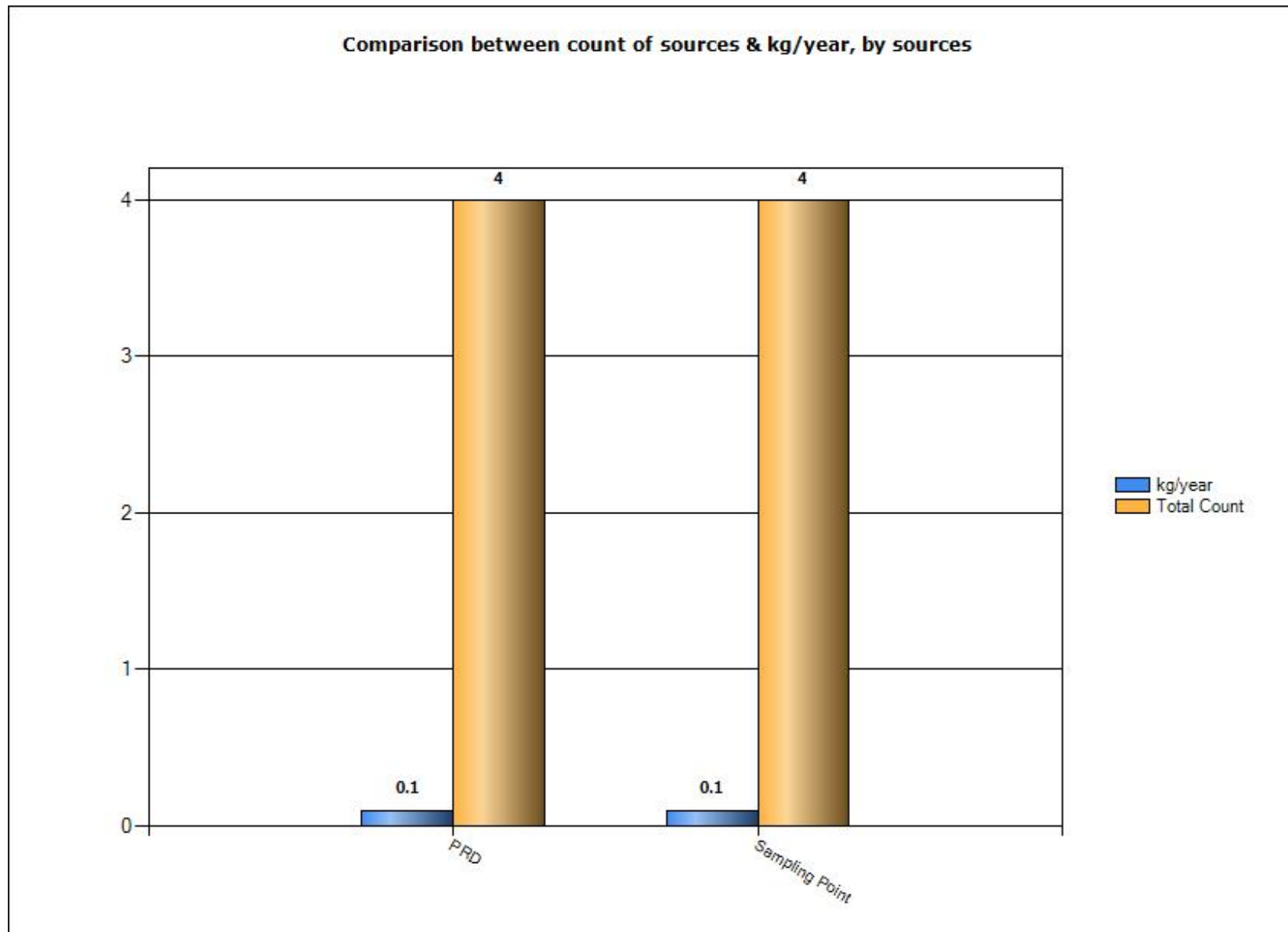
Total overview by chemicals



Graph6.1.1 R2



Graph6.1.3 R2



Graph6.1.2 R2

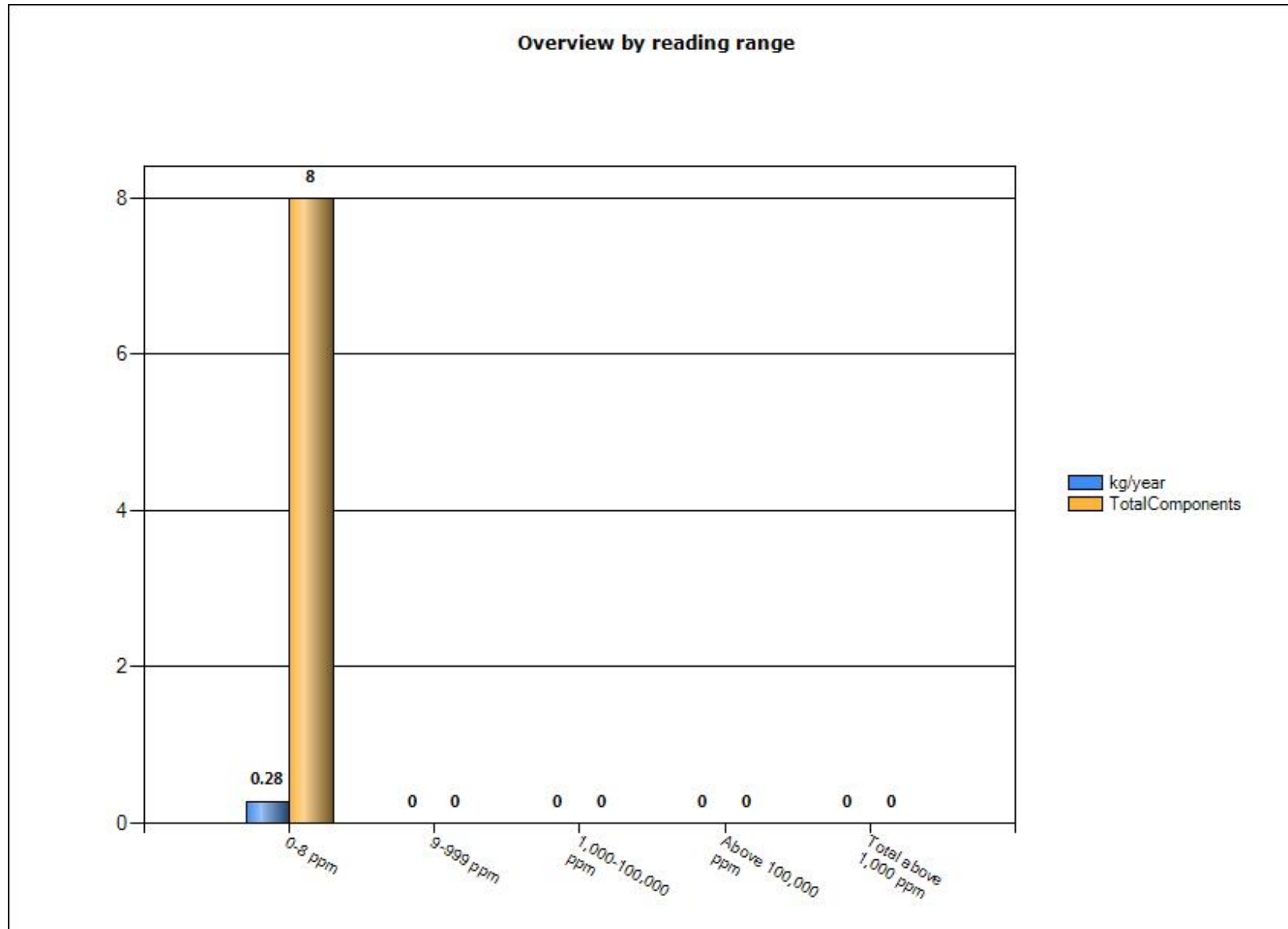
Graphs Round 2

Measurement after repair attempt.

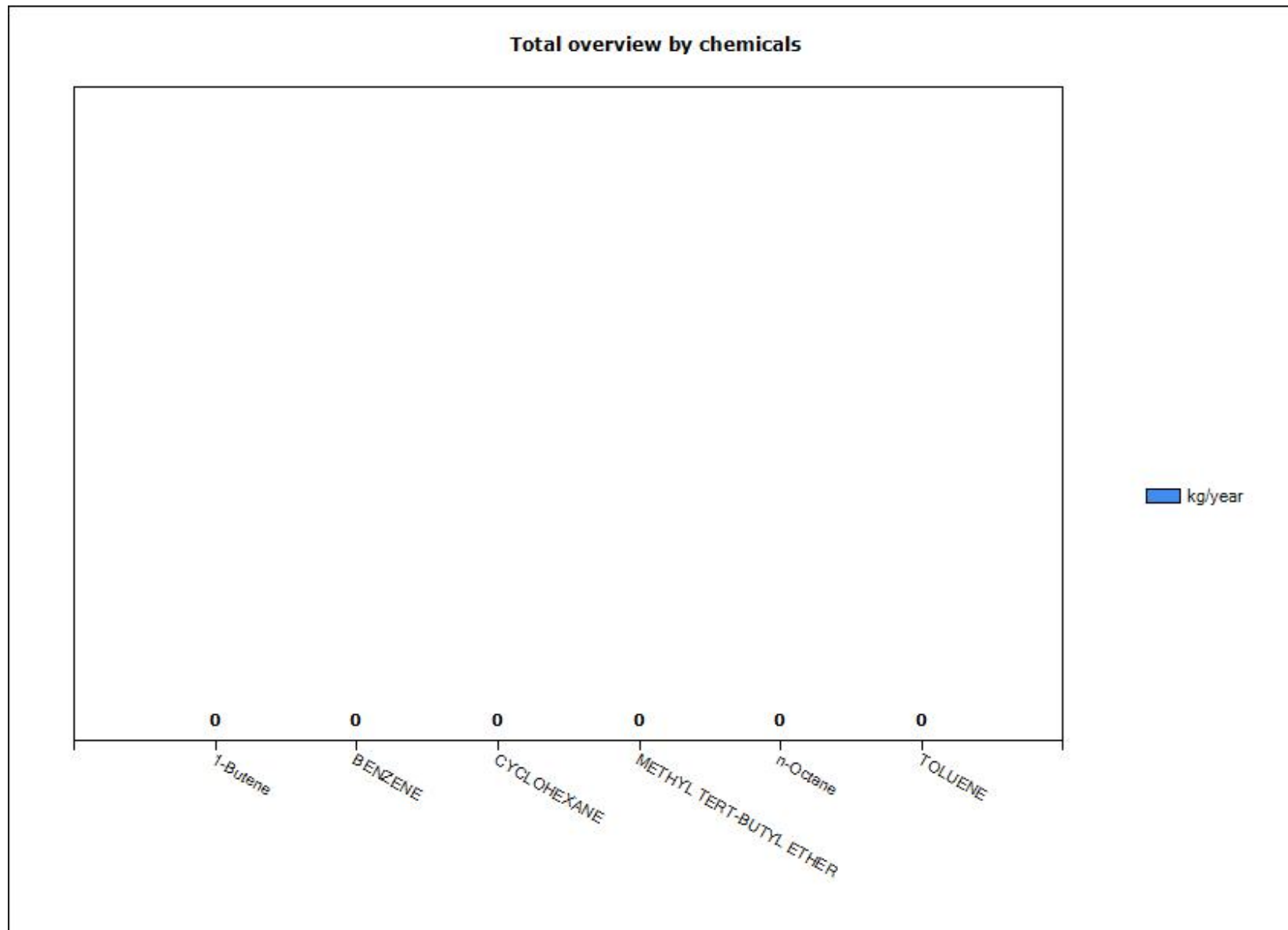
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

Total overview by chemicals

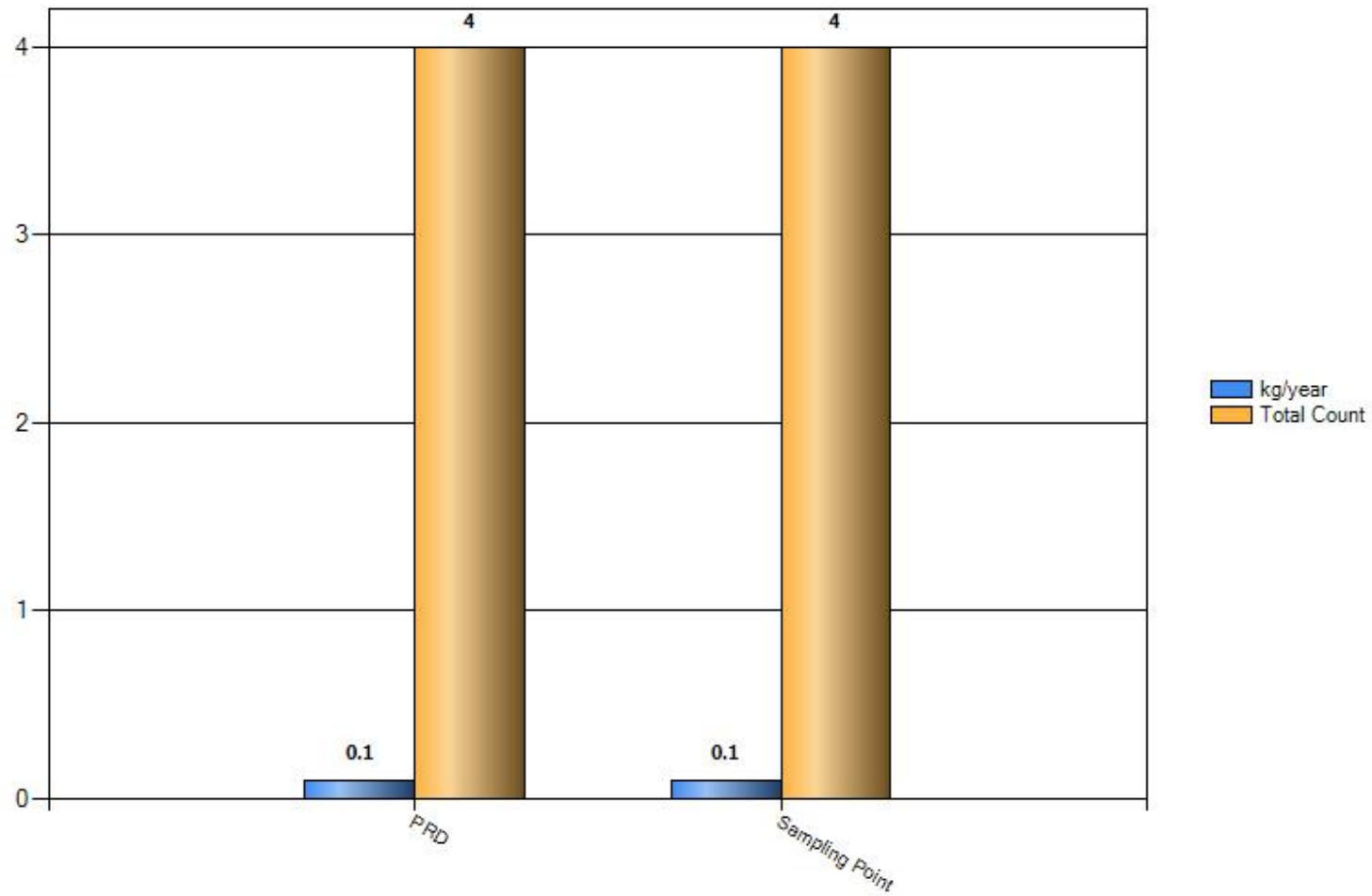


Graph6.2.1 R2



Graph6.2.3 R2

Comparison between count of sources & kg/year, by sources



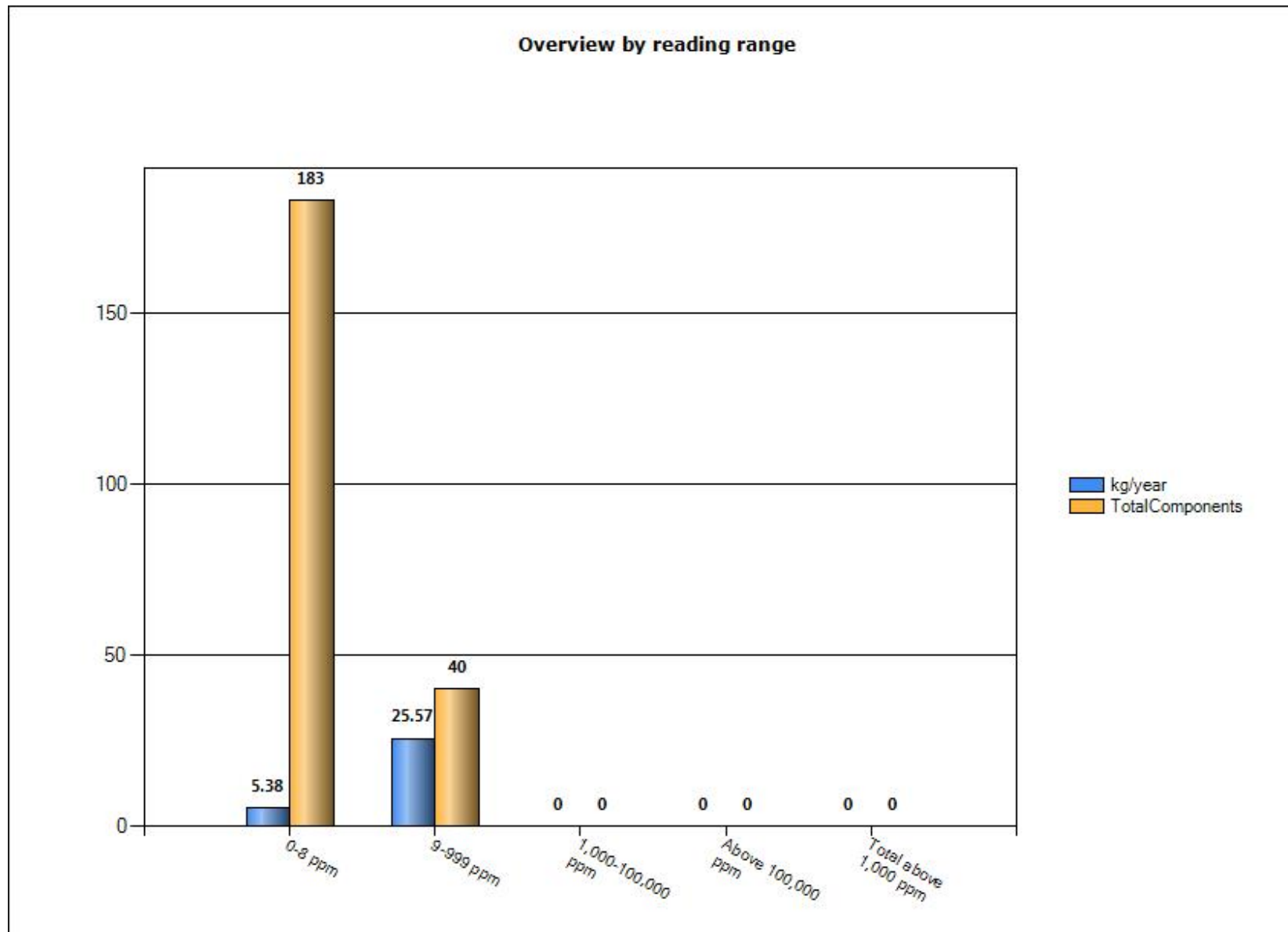
Graph6.2.2 R2

Graphs Round 3 First measurement.

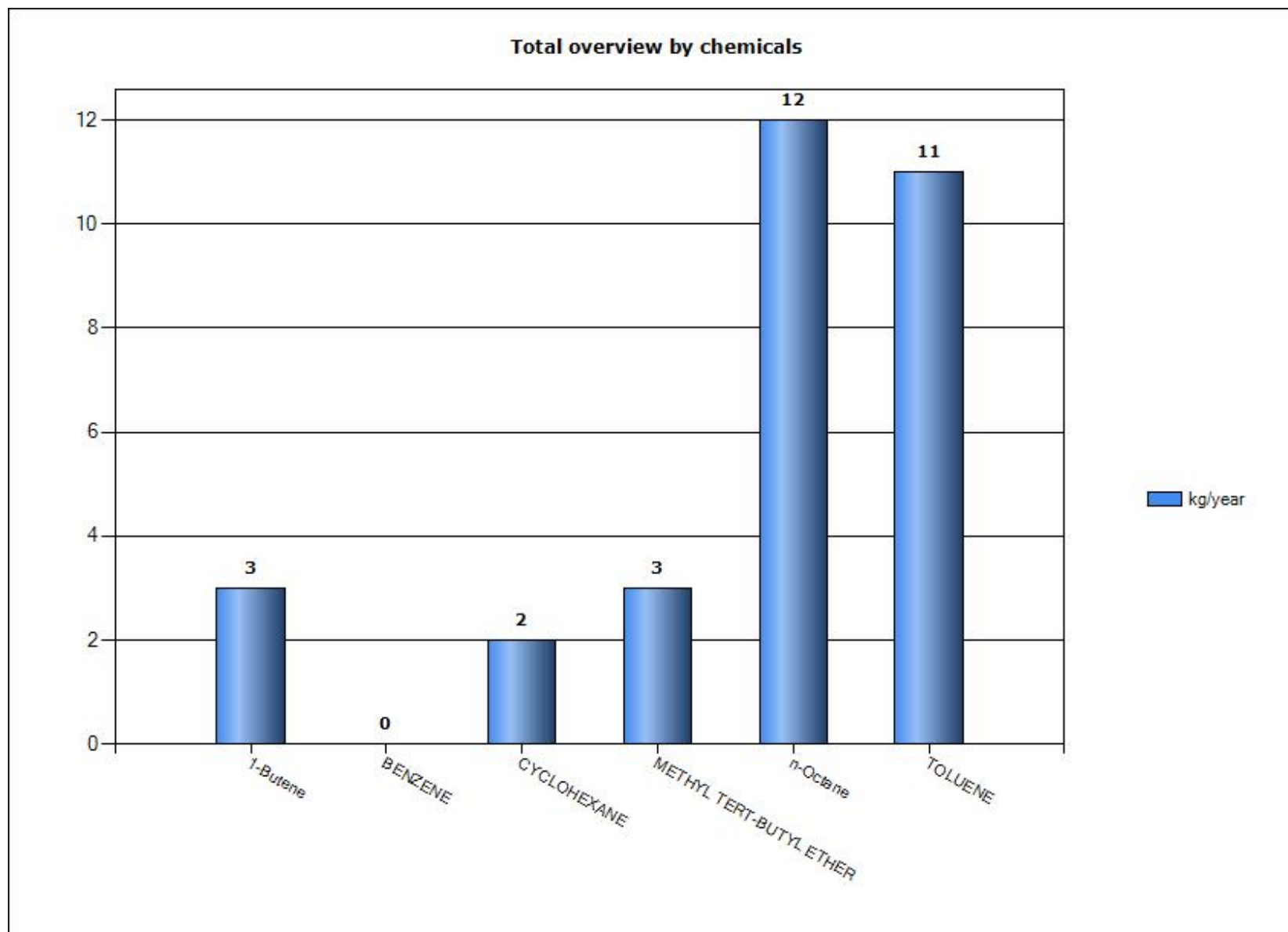
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

Total overview by chemicals

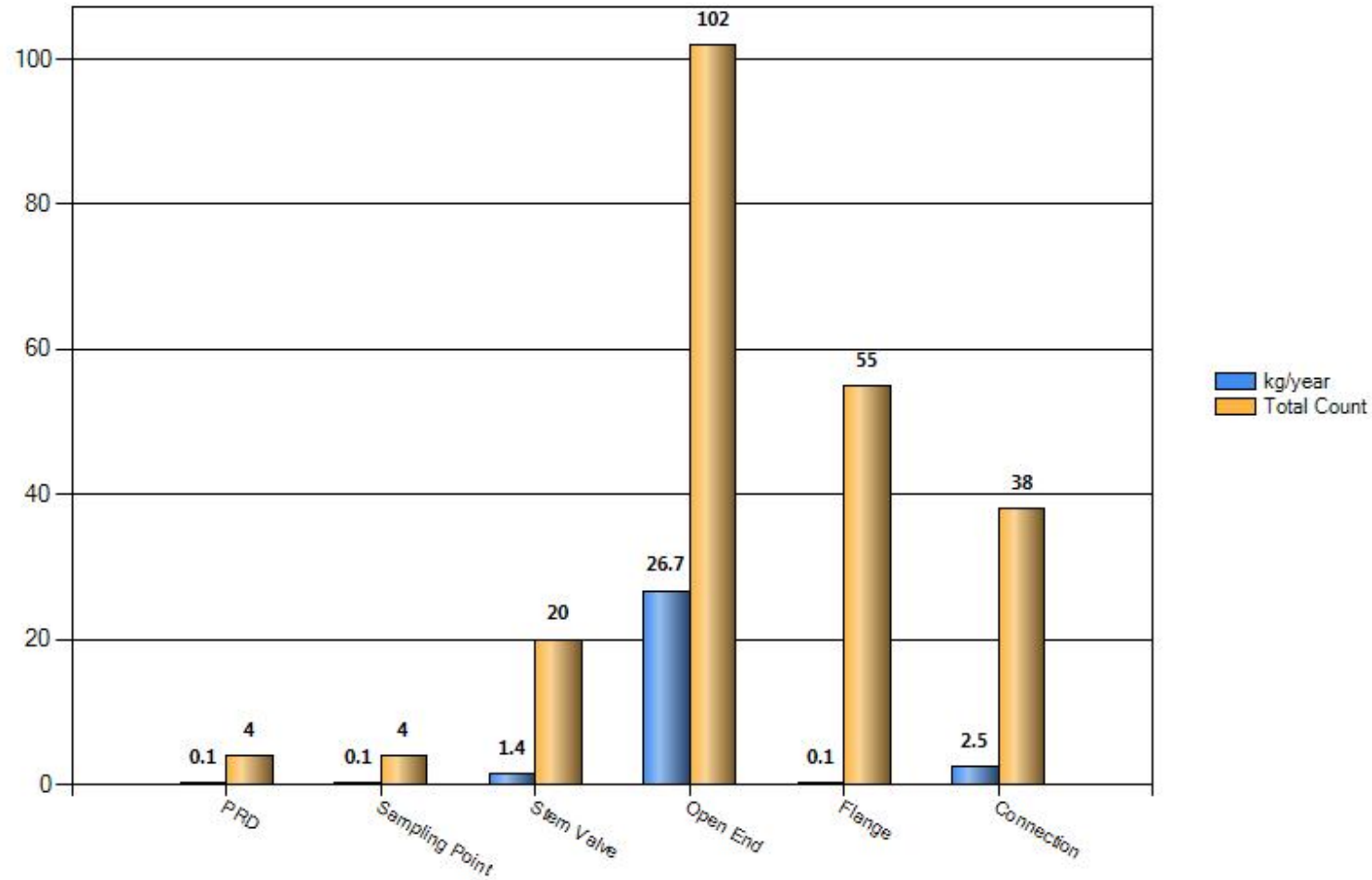


Graph6.1.1 R3



Graph6.1.3 R3

Comparison between count of sources & kg/year, by sources



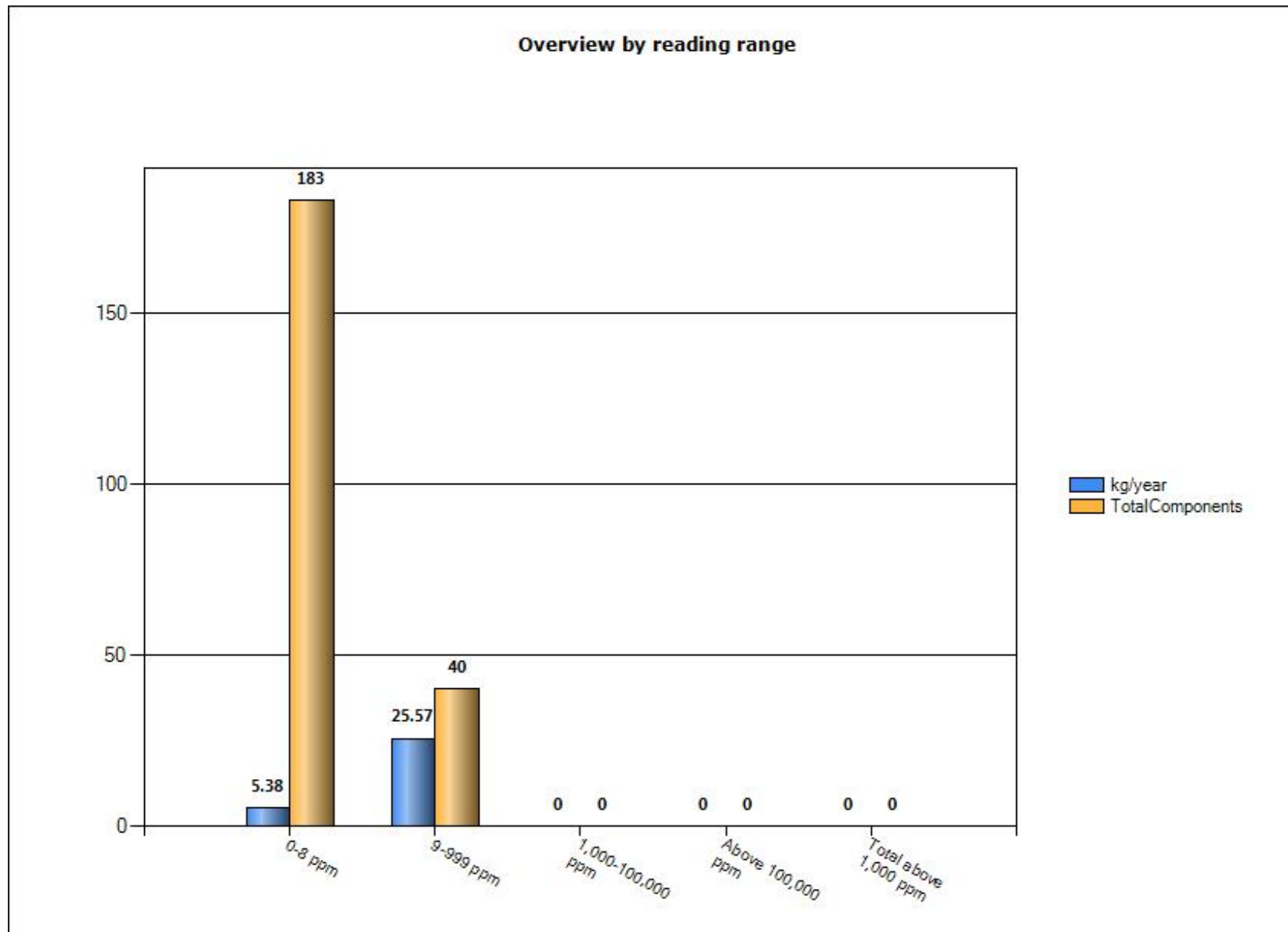
Graphs Round 3

Measurement after repair attempt.

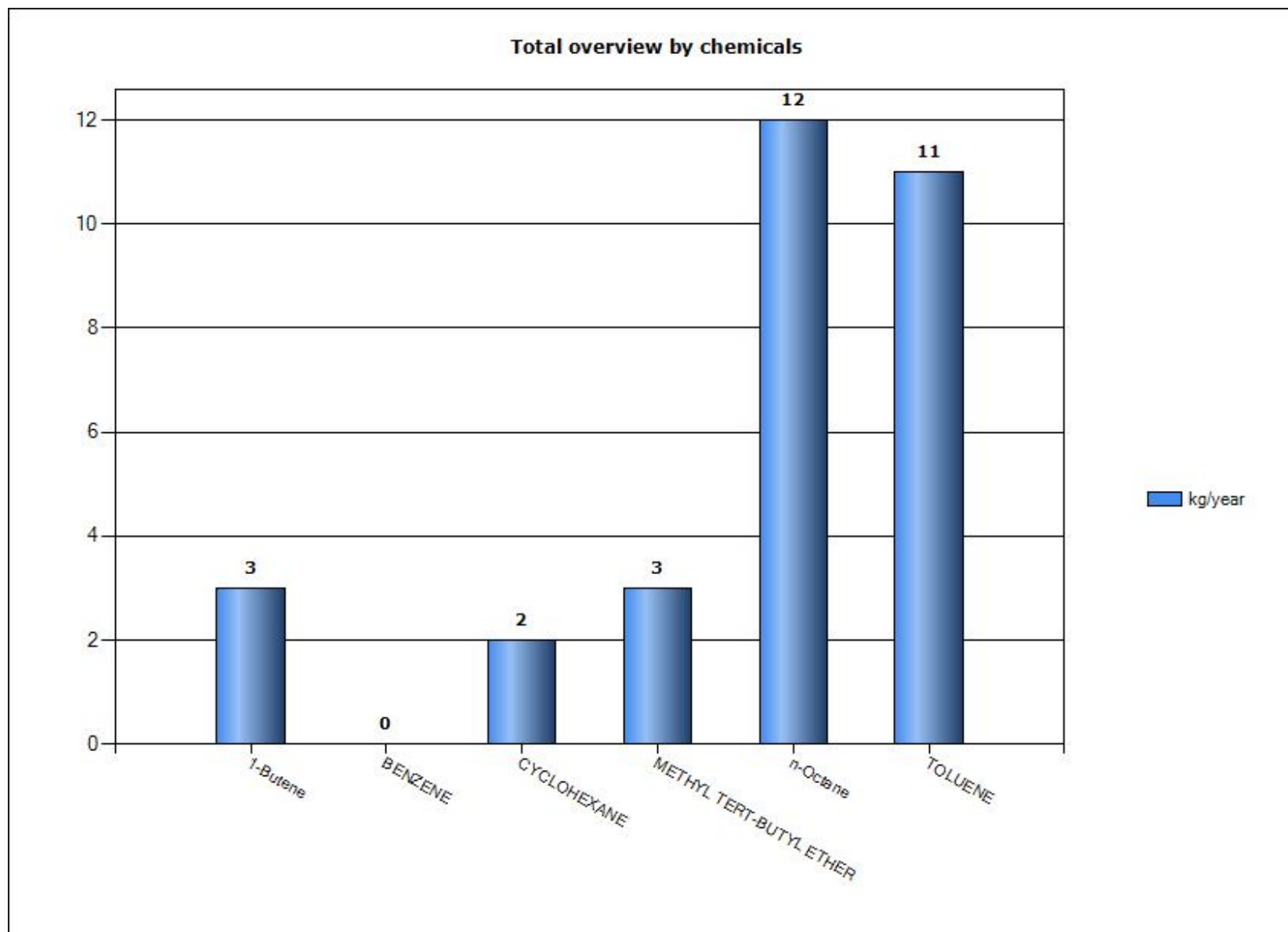
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

Total overview by chemicals

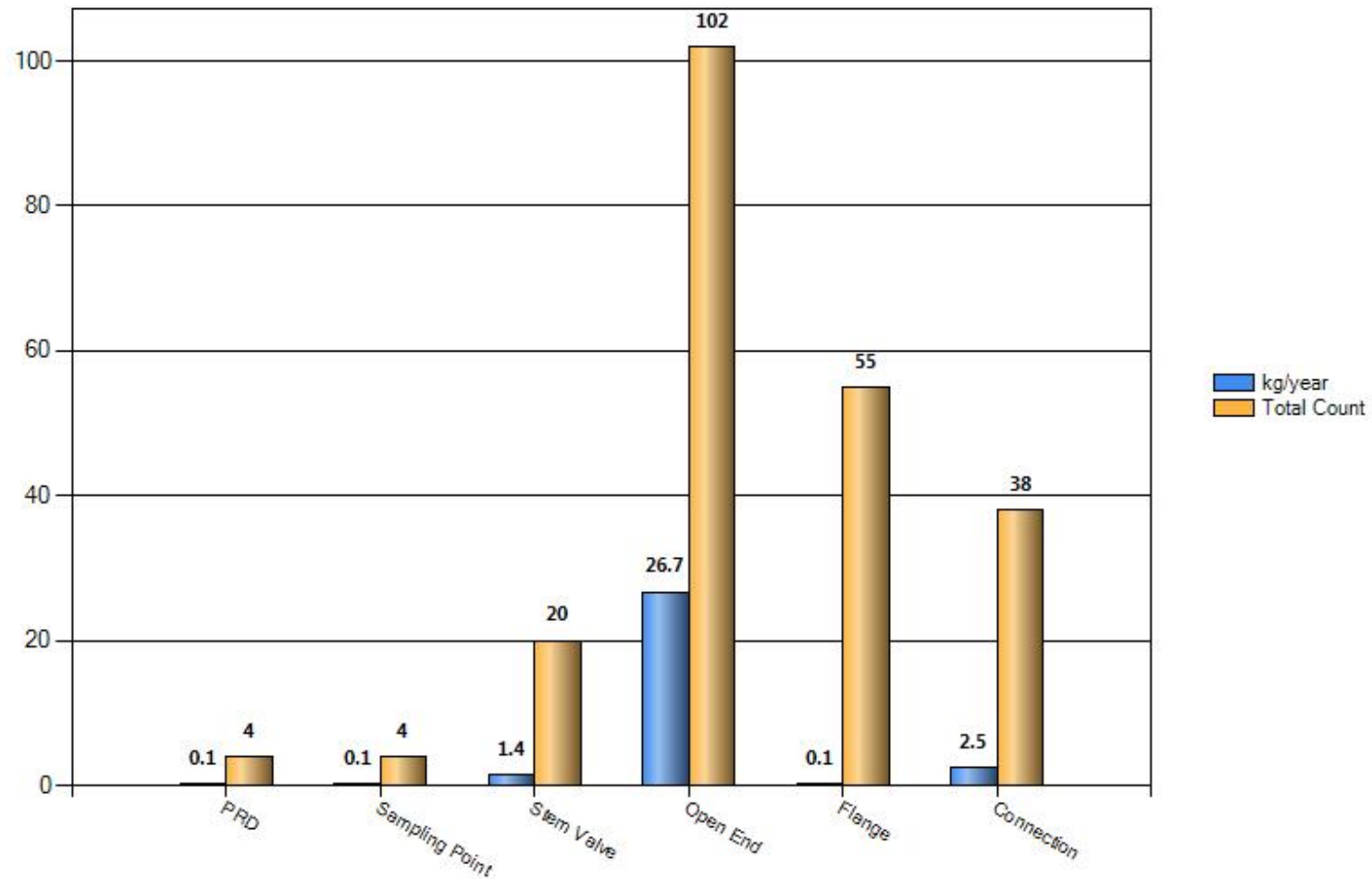


Graph6.2.1 R3



Graph6.2.3 R3

Comparison between count of sources & kg/year, by sources

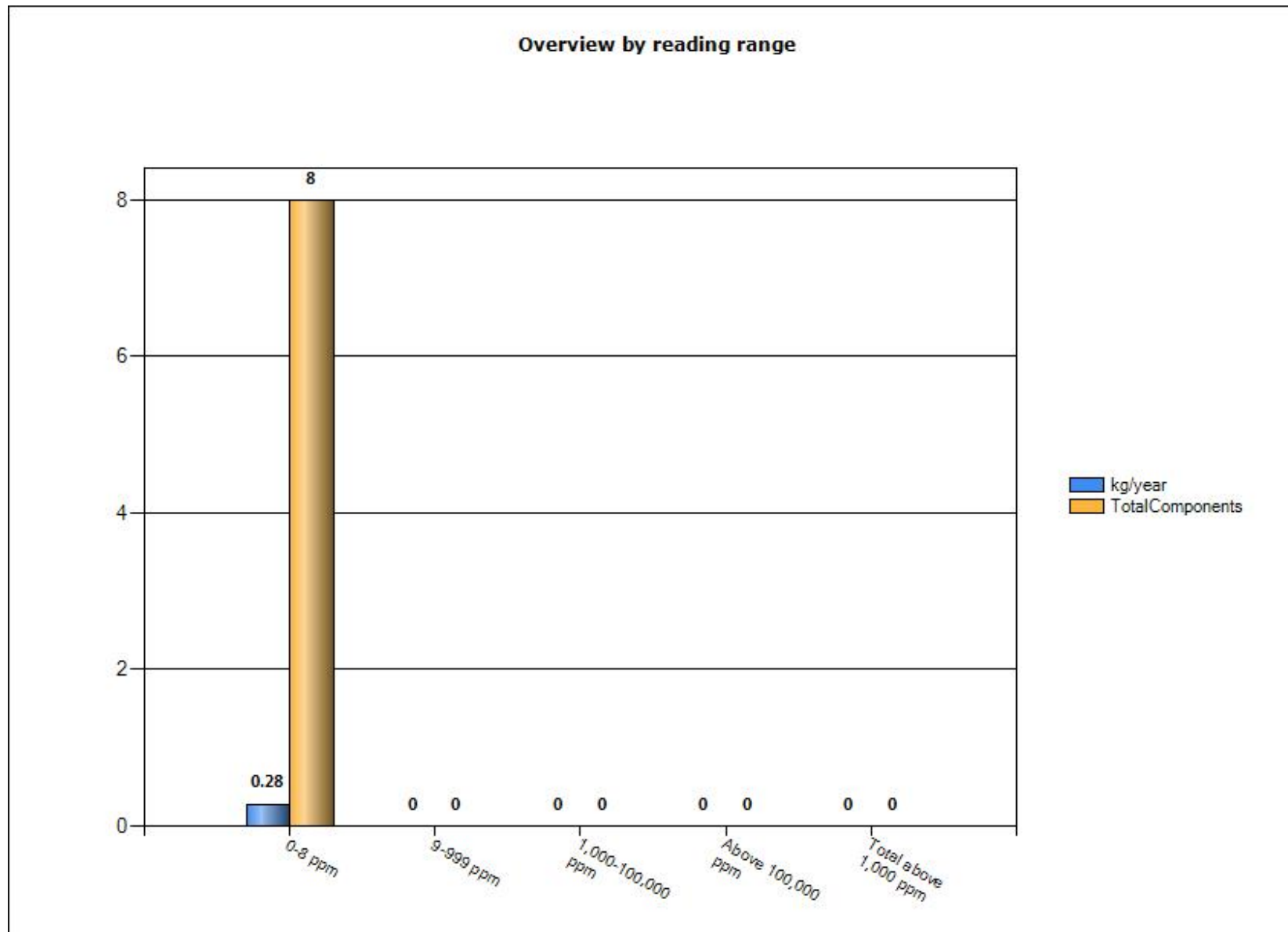


Graphs Round 4 First measurement.

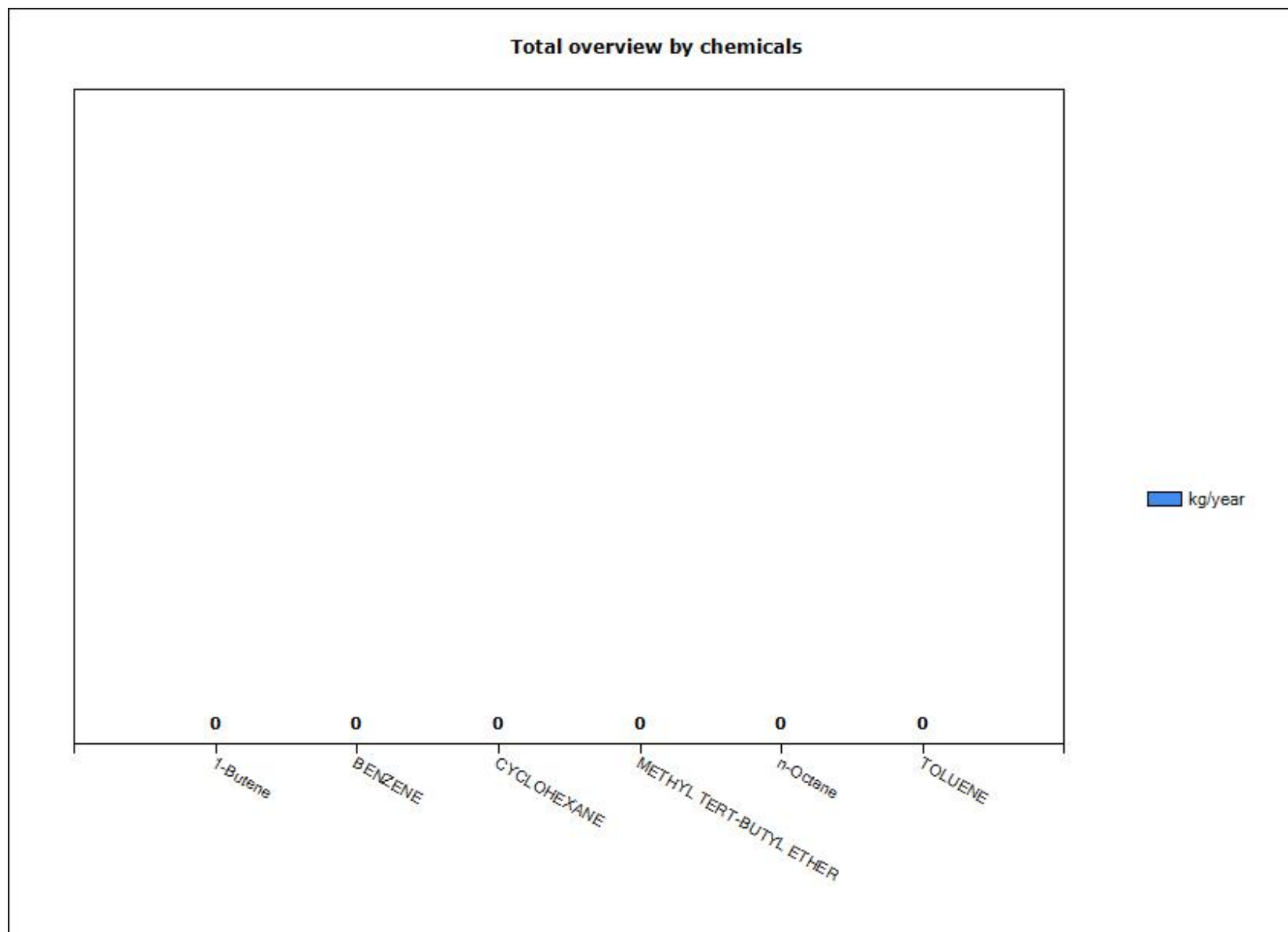
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

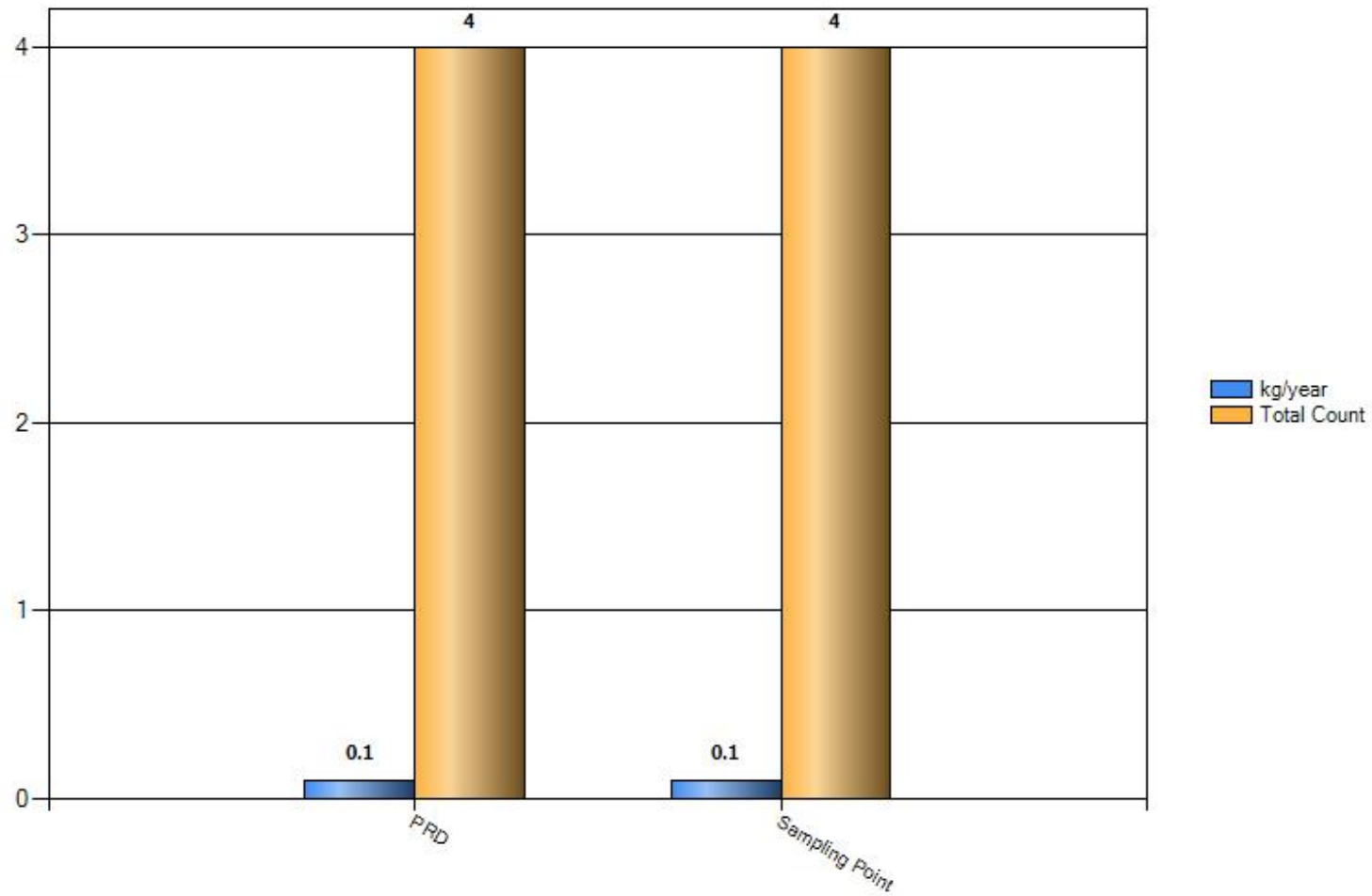
Total overview by chemicals



Graph6.1.1 R4



Comparison between count of sources & kg/year, by sources



Graph6.1.2 R4



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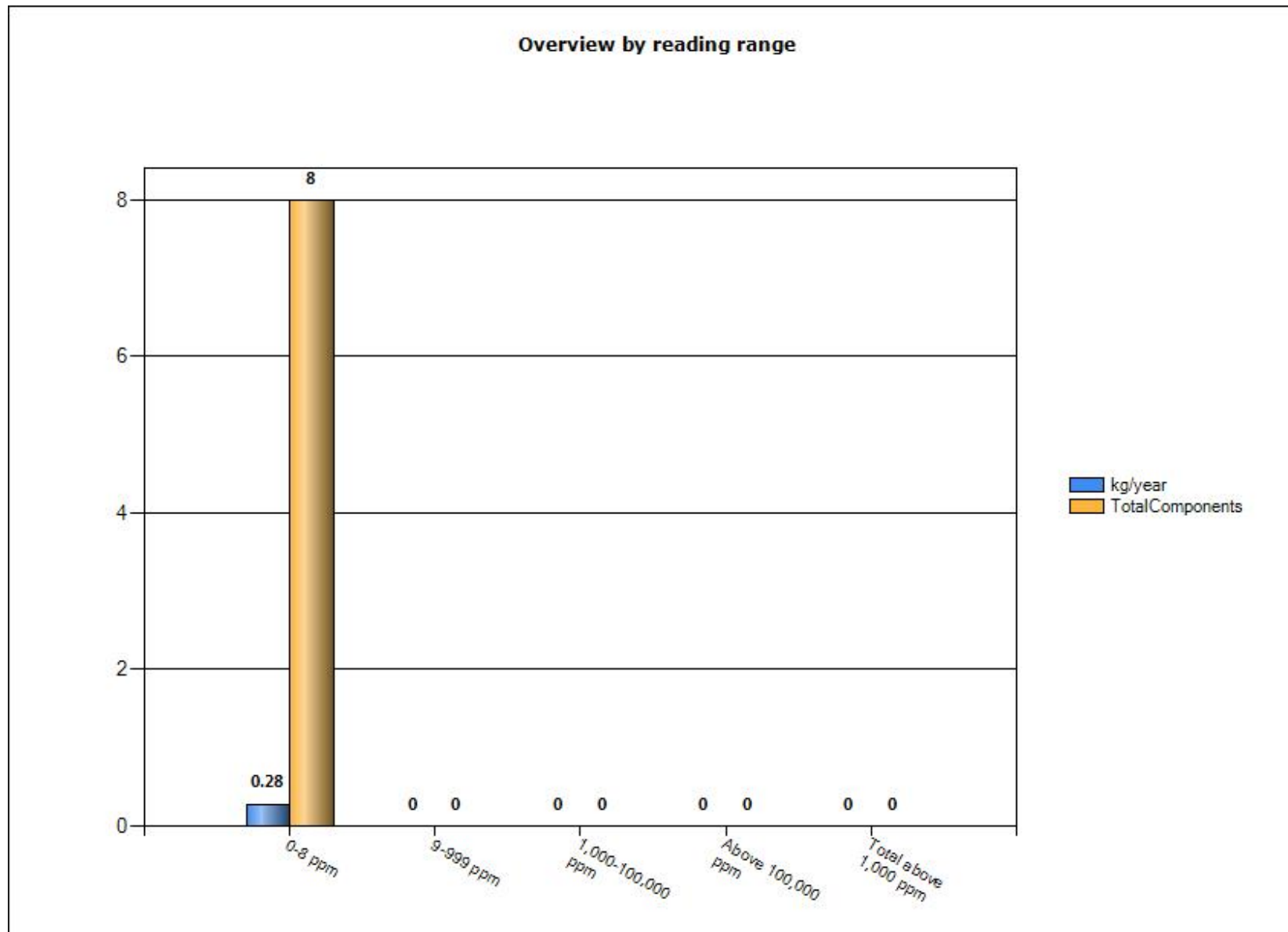
Graphs Round 4

Measurement after repair attempt.

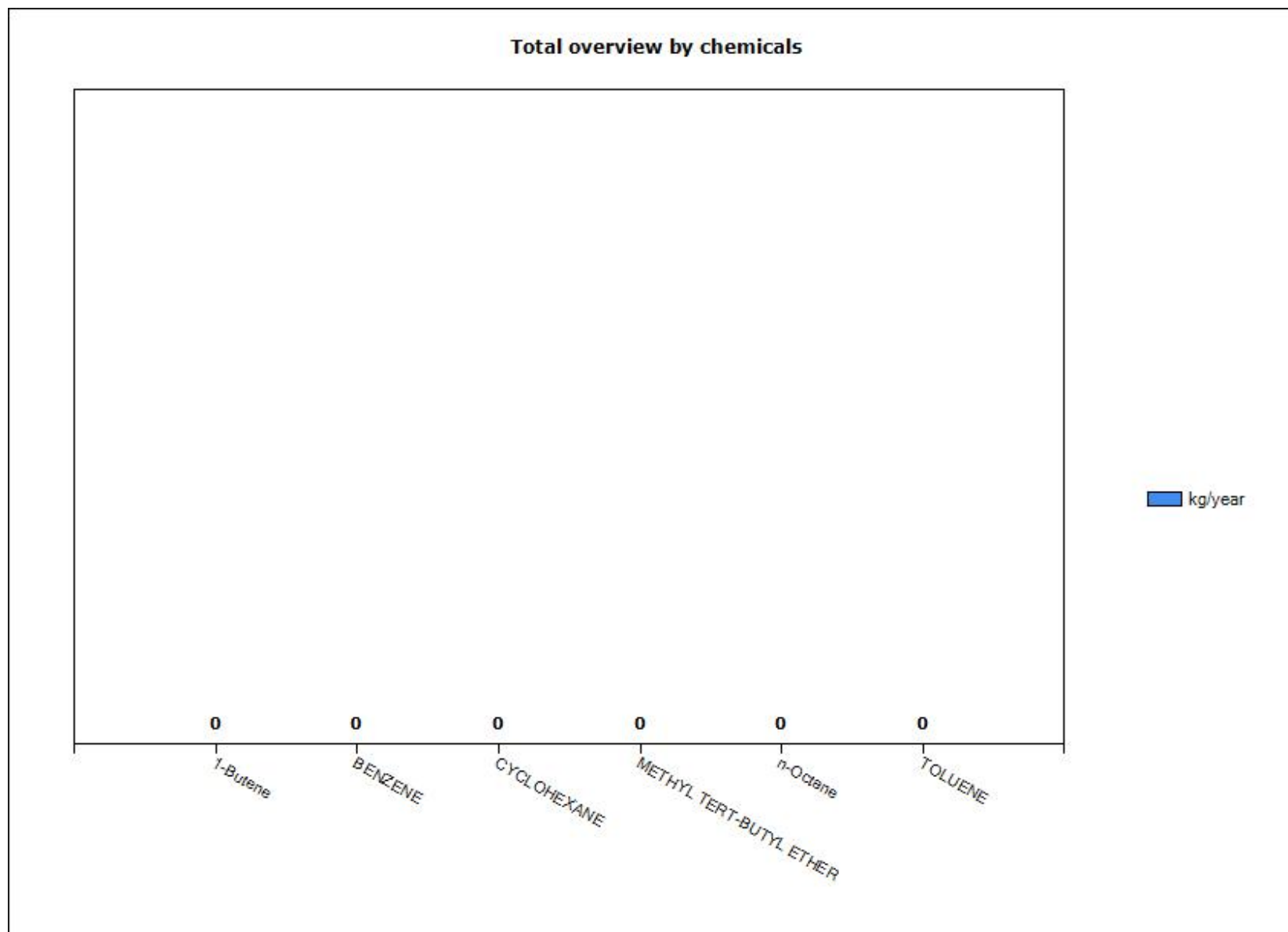
Comparison between count of sources & kg/year, by reading range

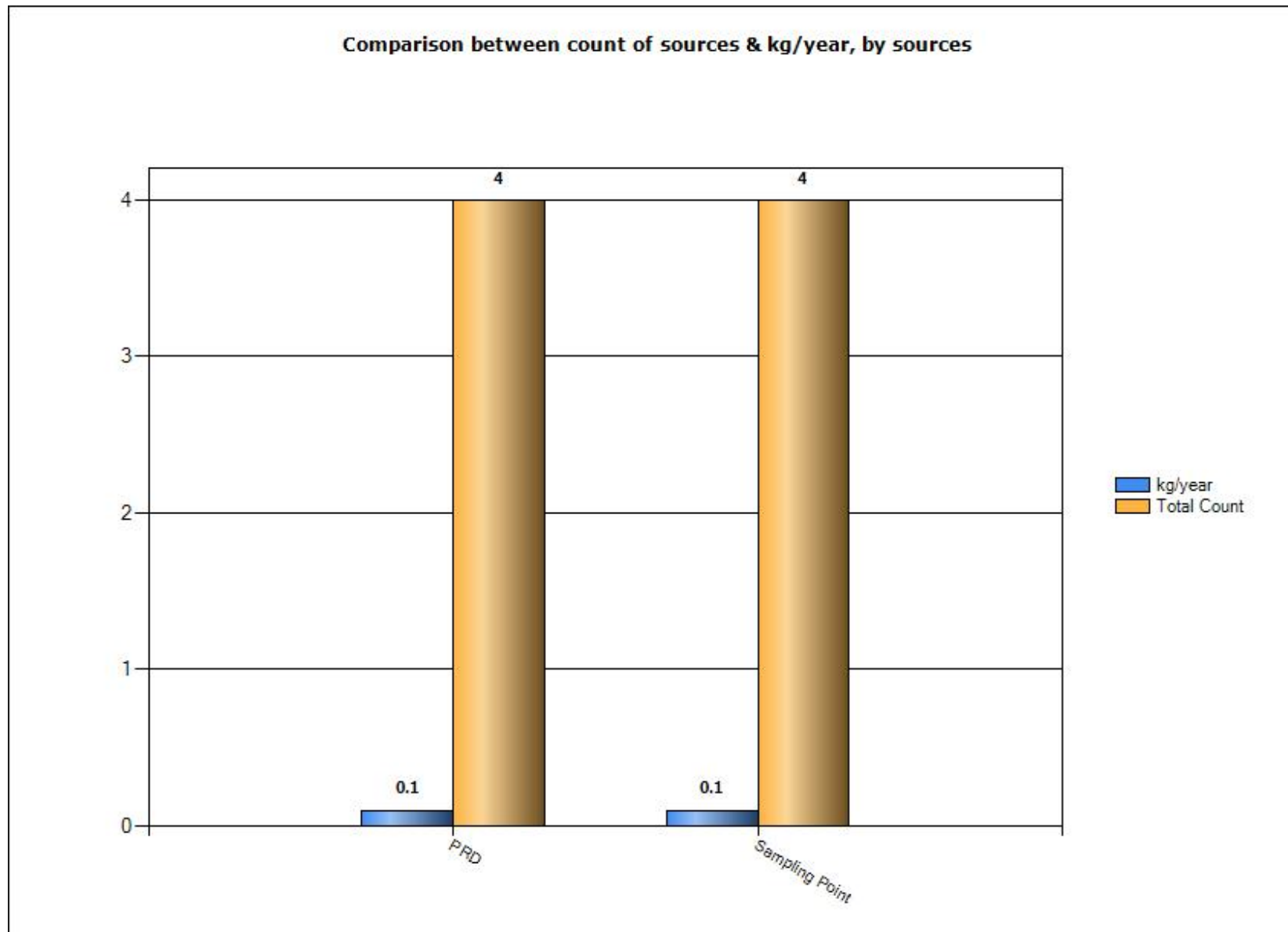
Comparison between count of sources & kg/year, by sources

Total overview by chemicals



Graph6.2.1 R4





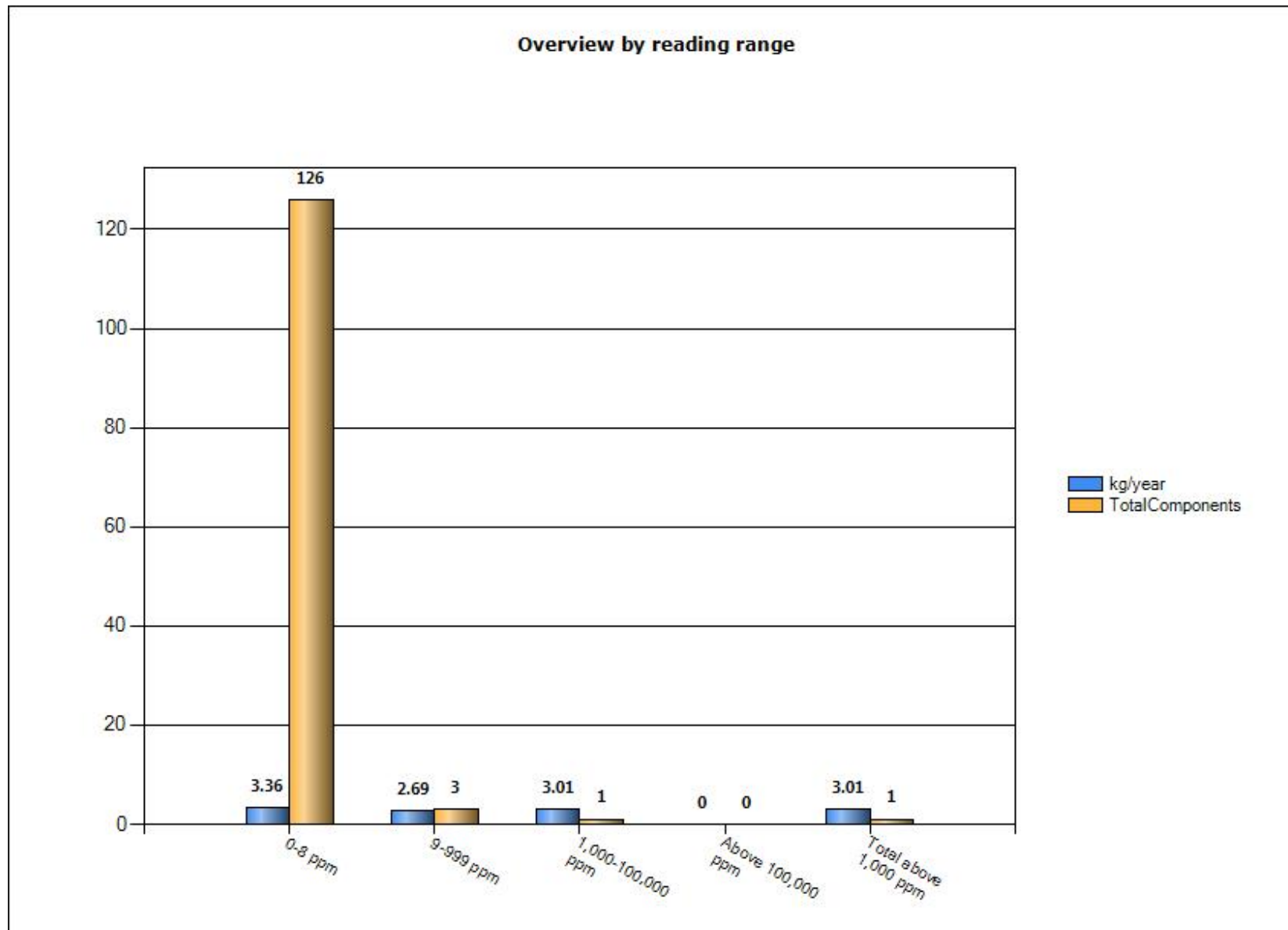
Graph6.2.2 R4

Graphs Round 5 First measurement.

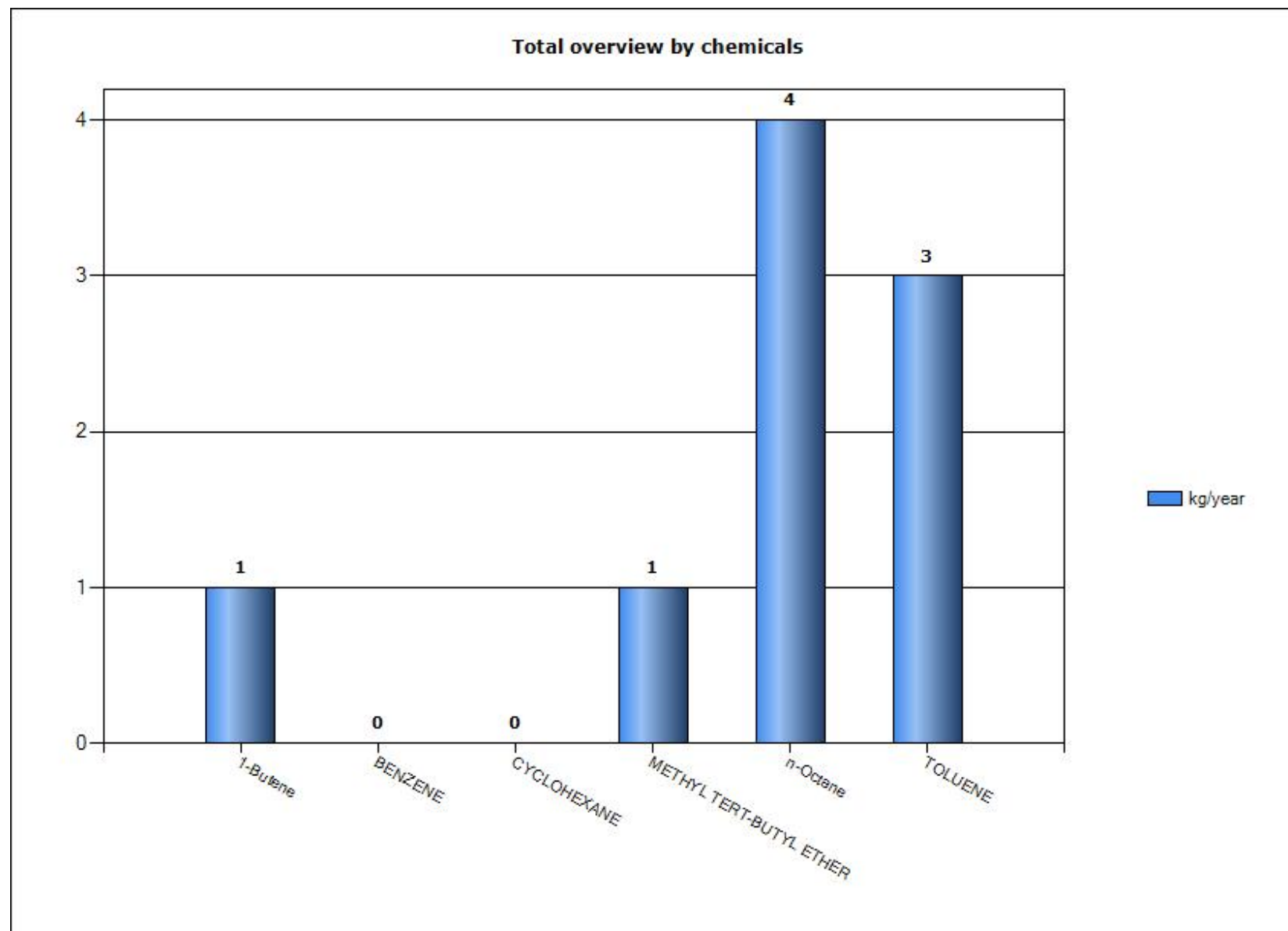
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

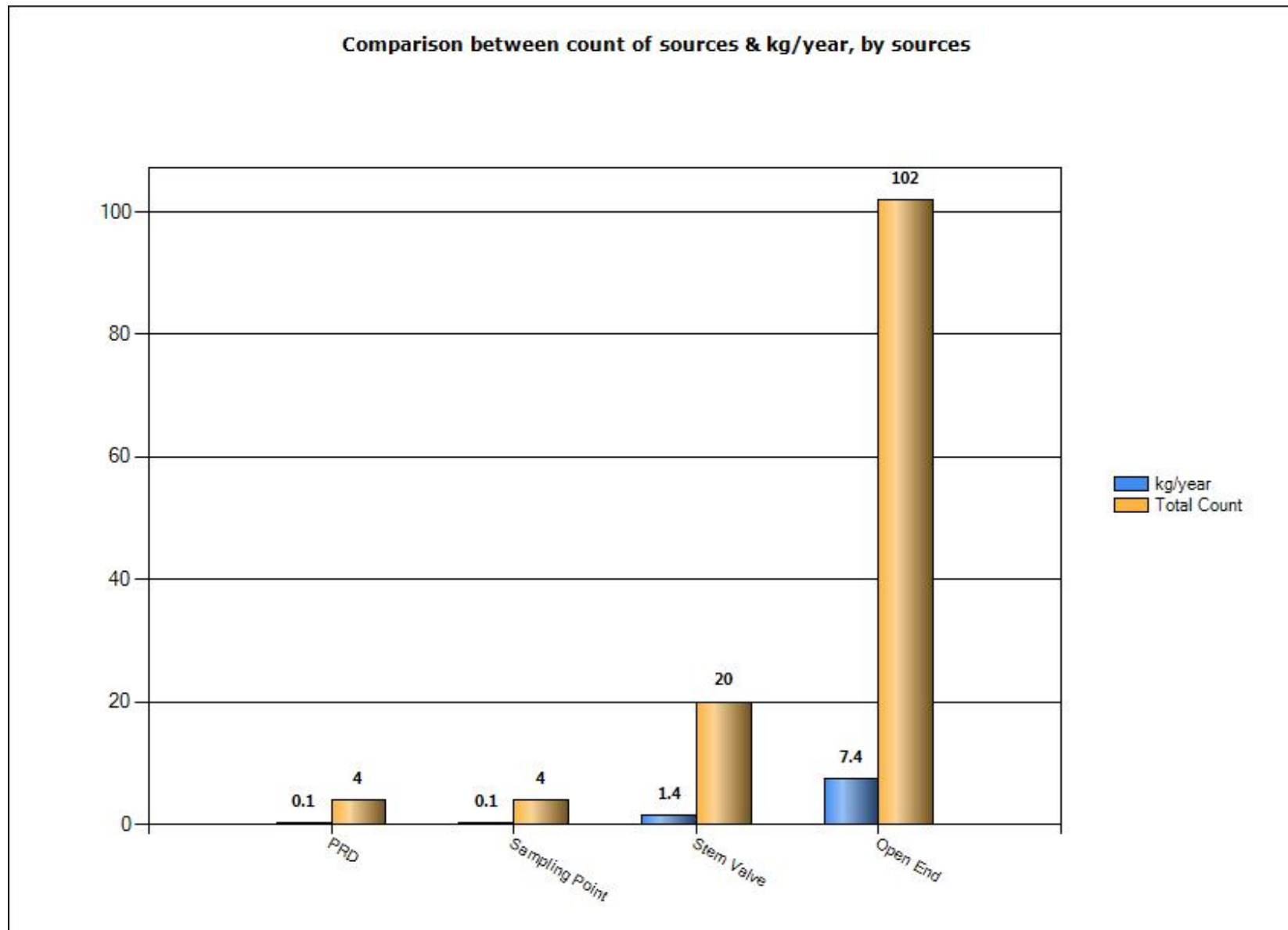
Total overview by chemicals



Graph6.1.1 R5



Graph6.1.3 R5



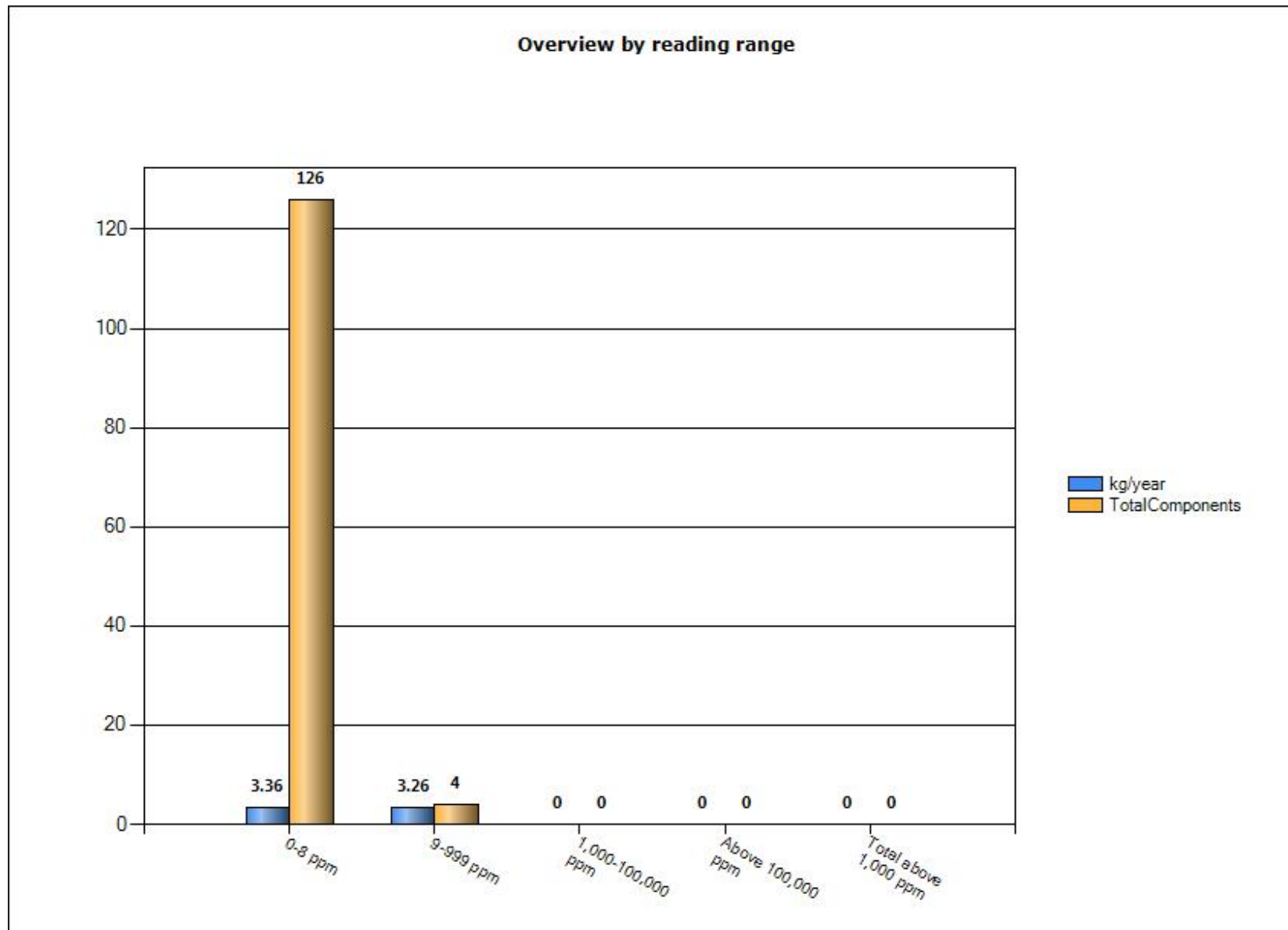
Graphs Round 5

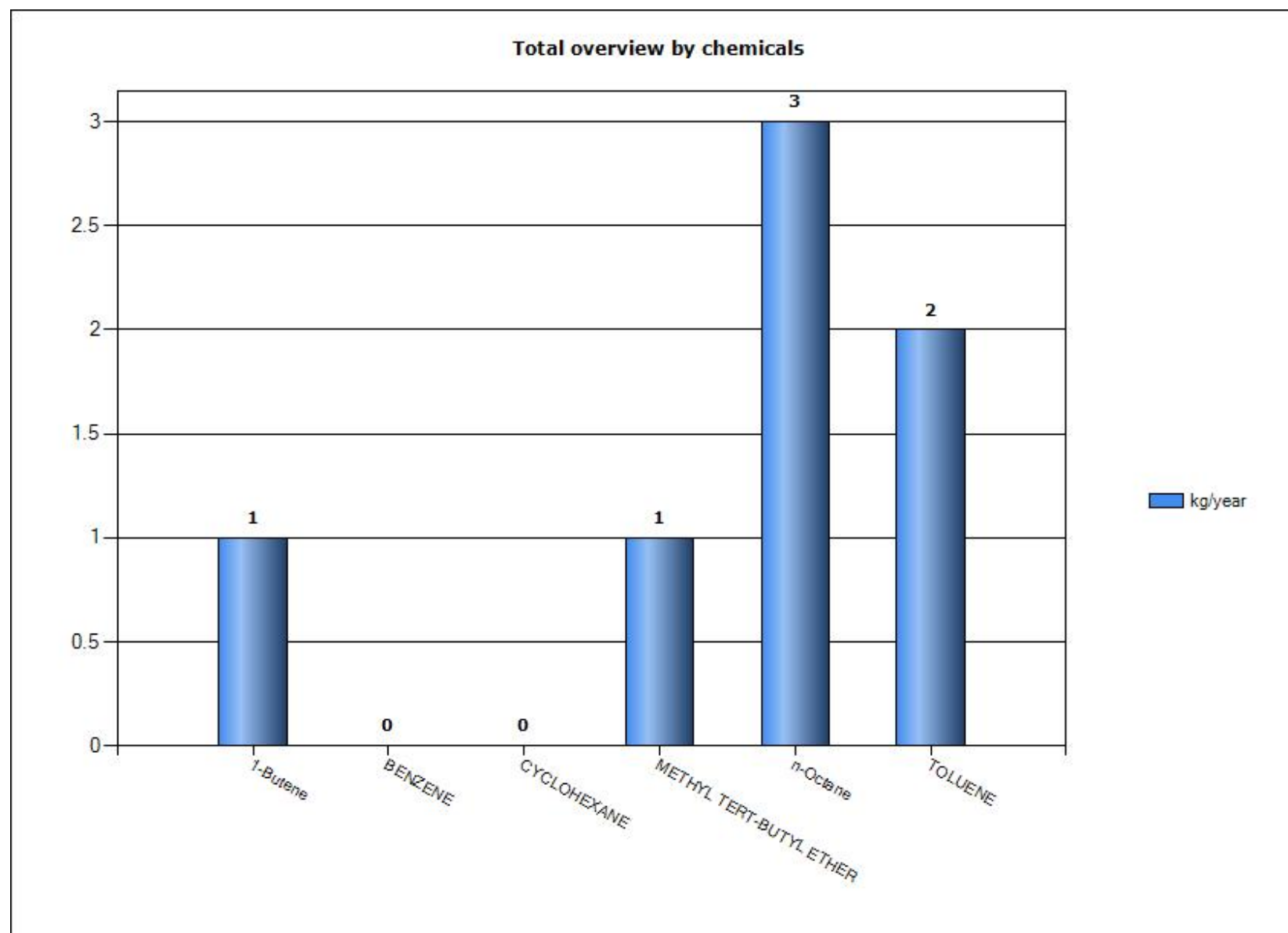
Measurement after repair attempt.

Comparison between count of sources & kg/year, by reading range

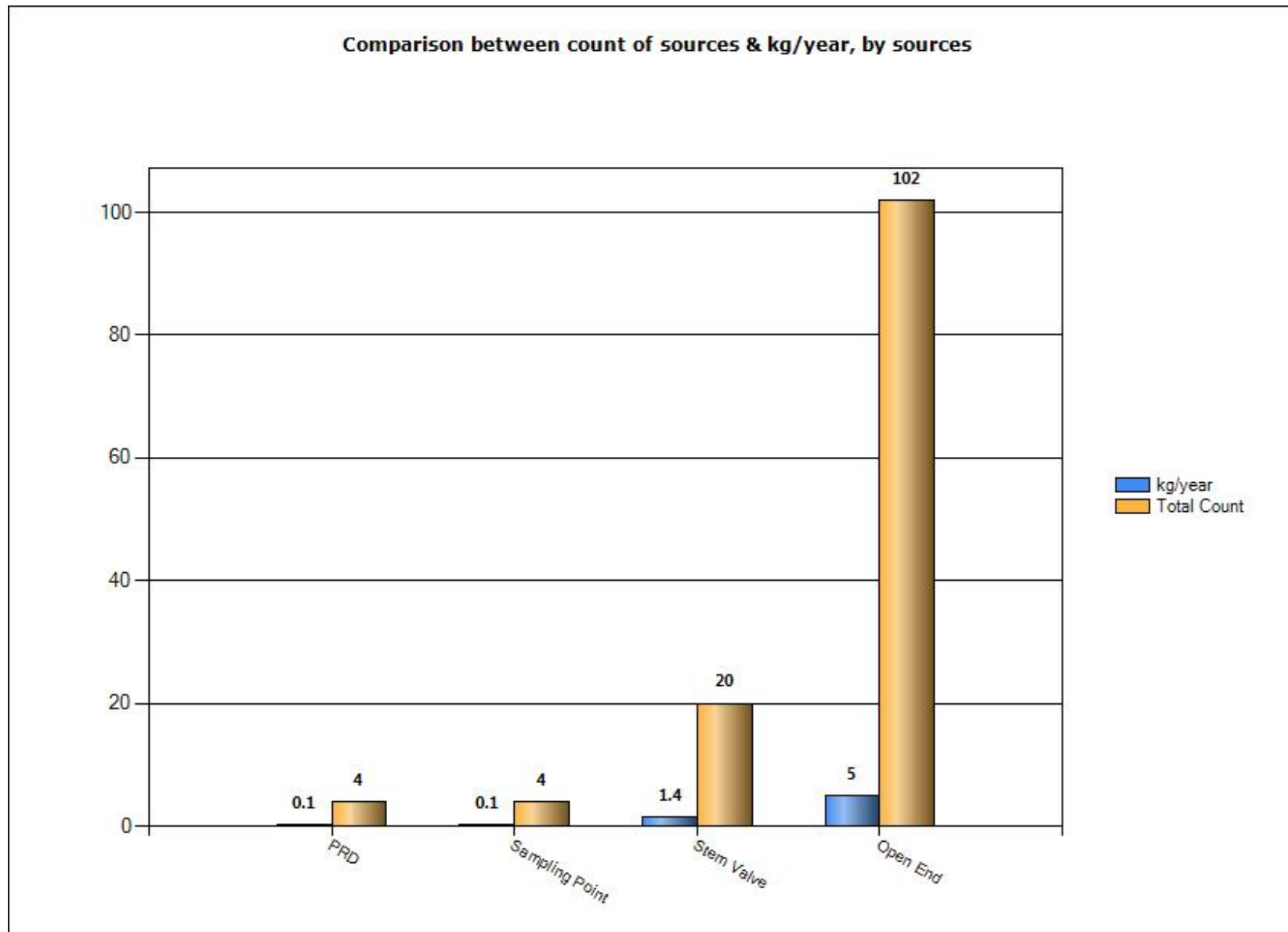
Comparison between count of sources & kg/year, by sources

Total overview by chemicals





Graph6.2.3 R5

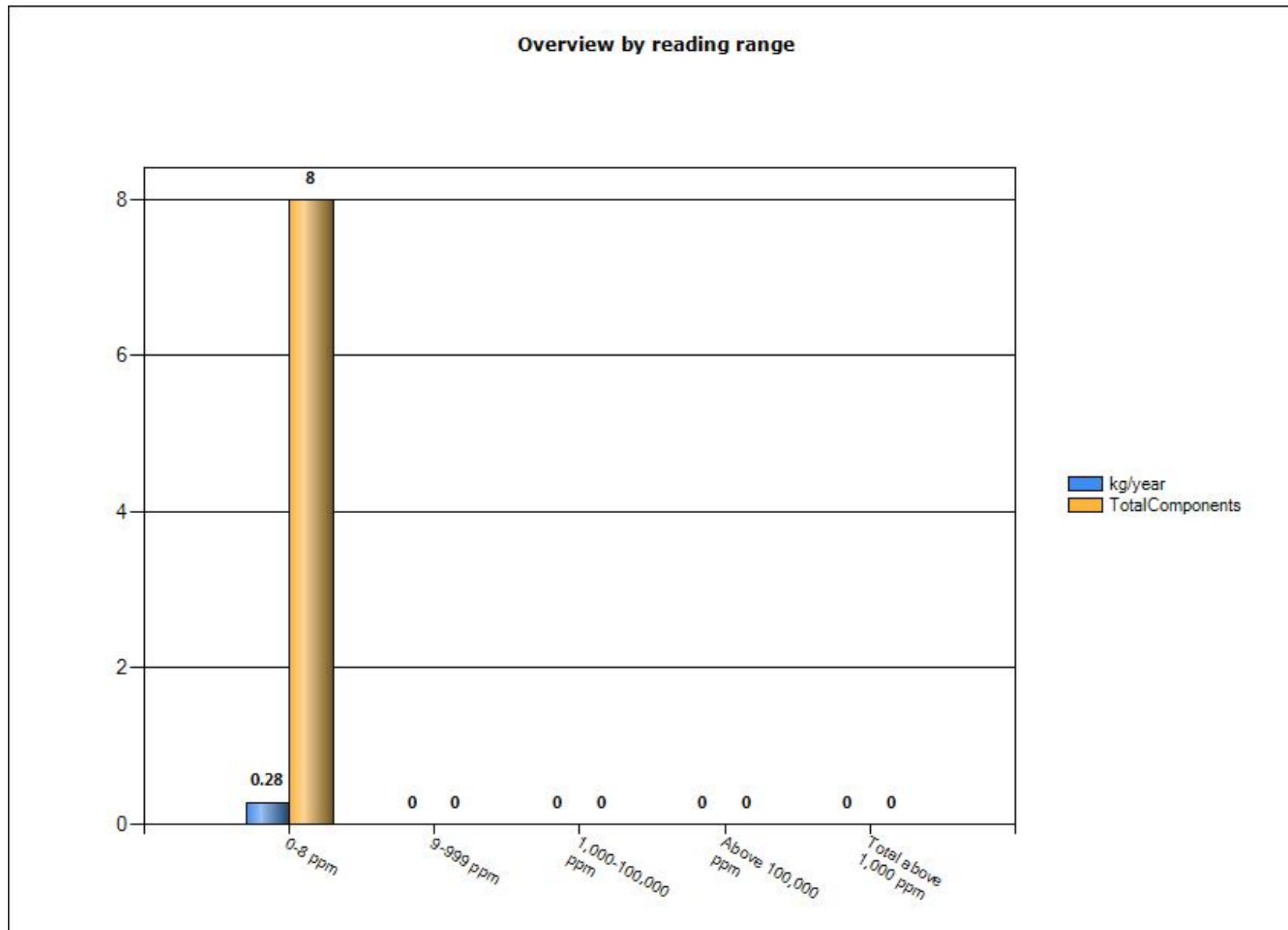


Graphs Round 6 First measurement.

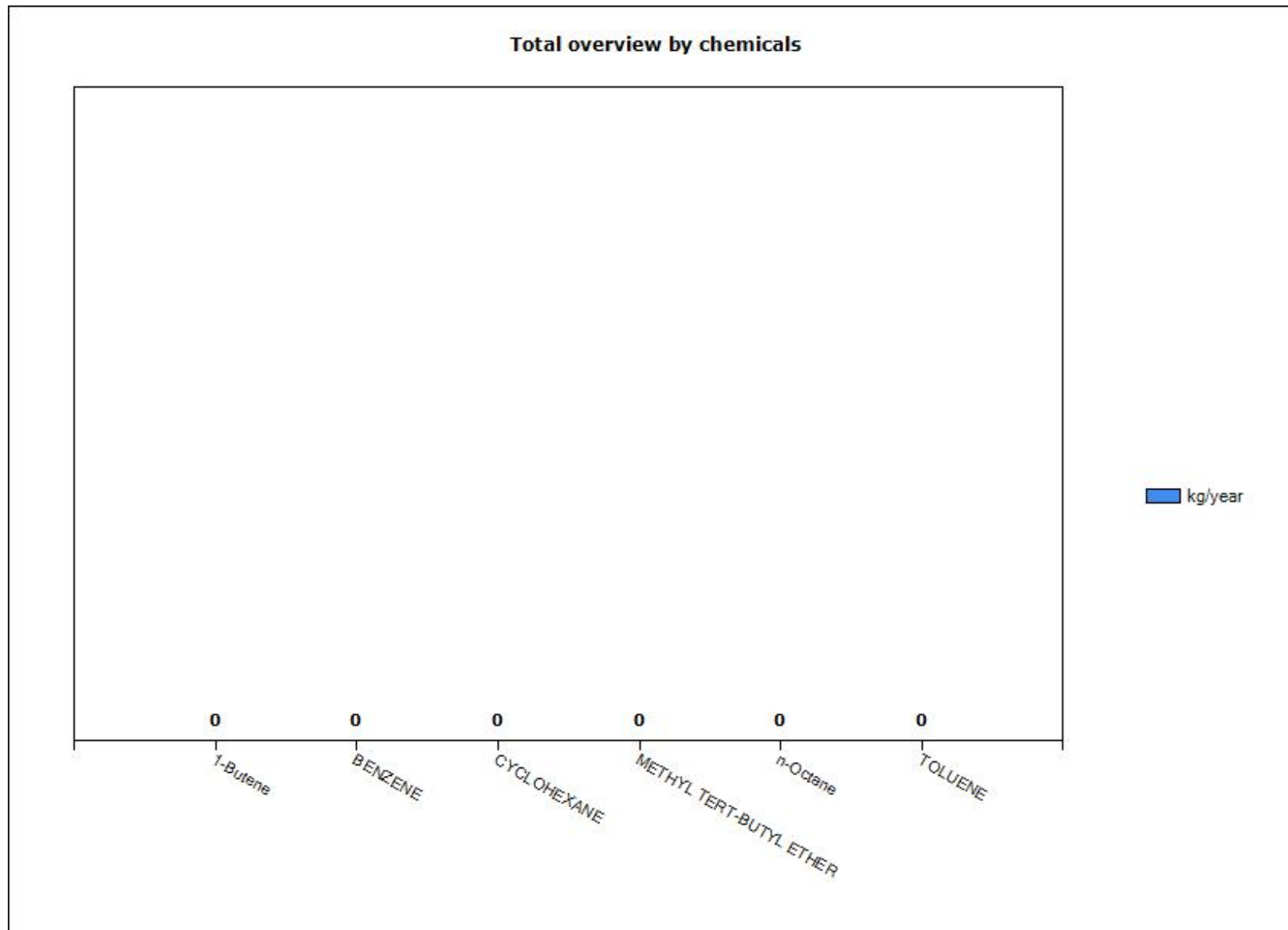
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

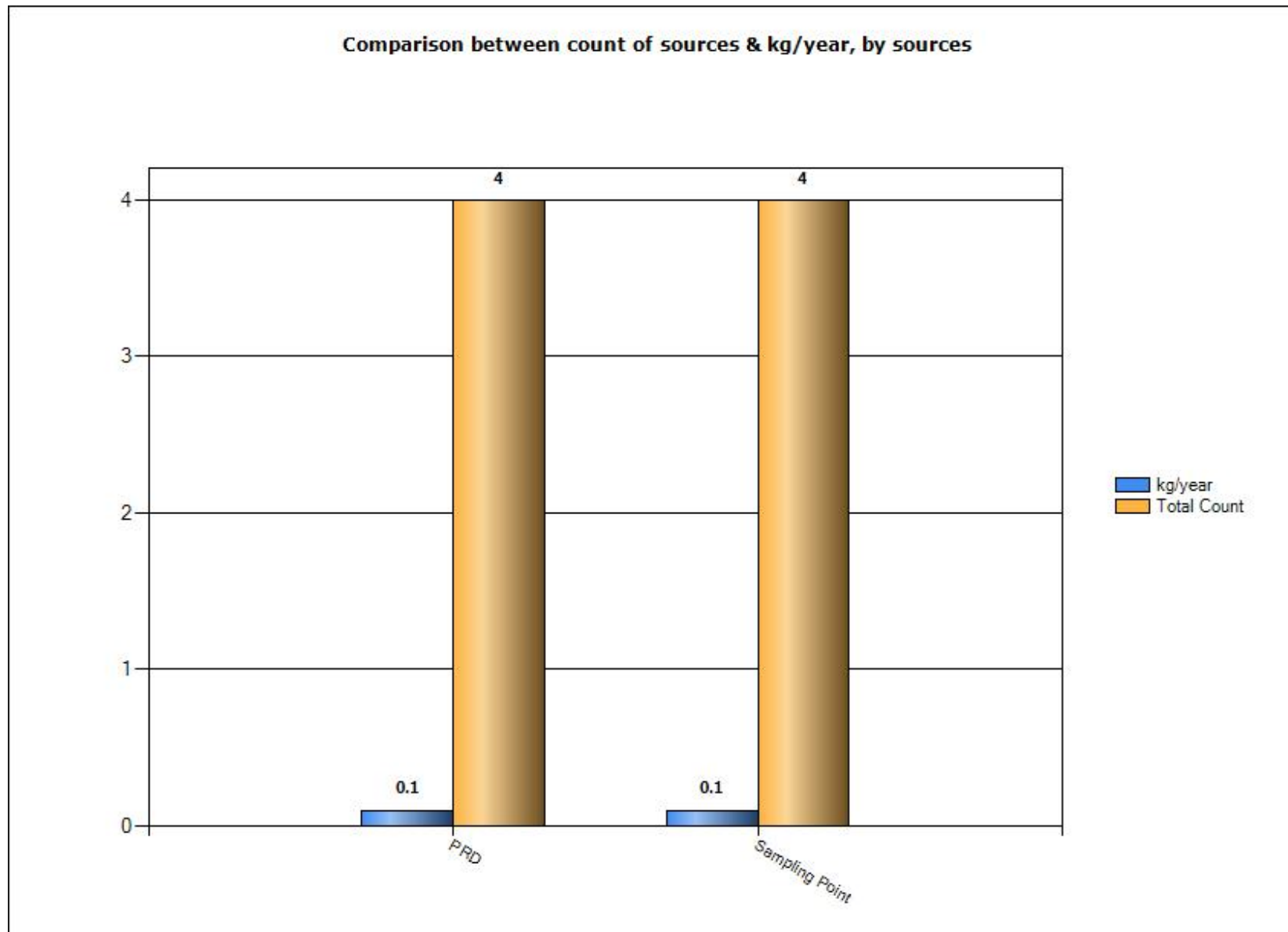
Total overview by chemicals



Graph6.1.1 R6



Graph6.1.3 R6



Graph6.1.2 R6

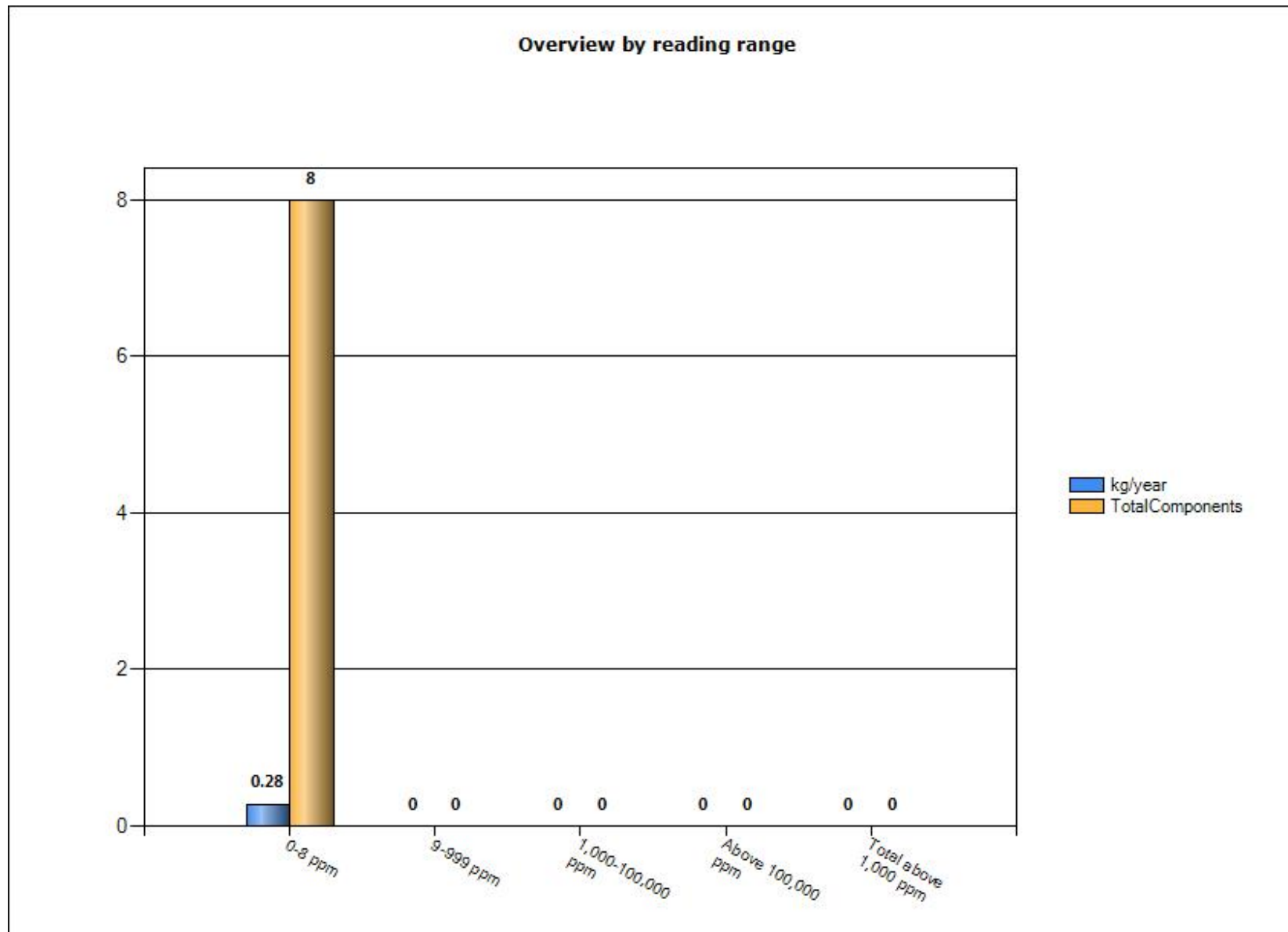
Graphs Round 6

Measurement after repair attempt.

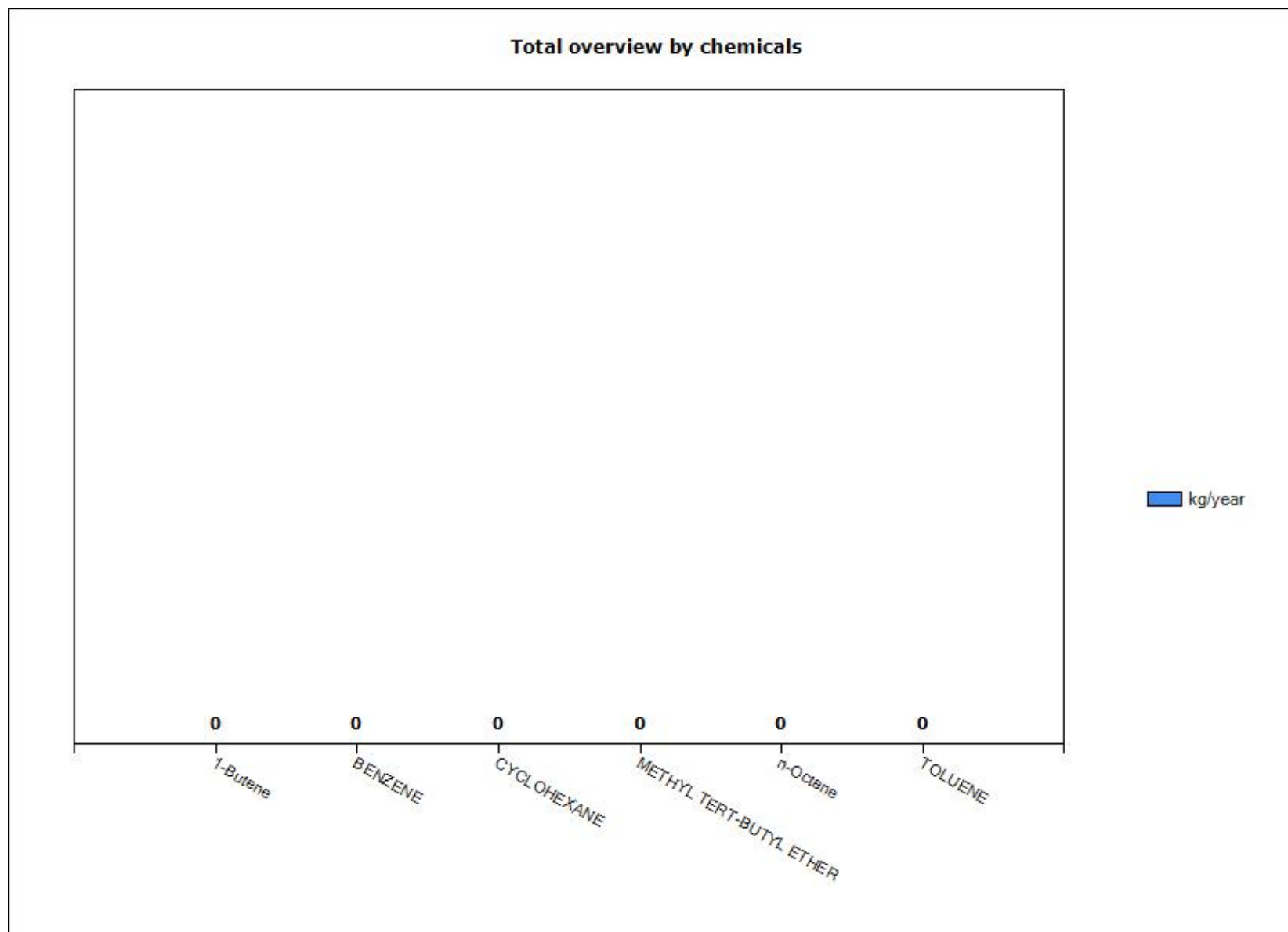
Comparison between count of sources & kg/year, by reading range

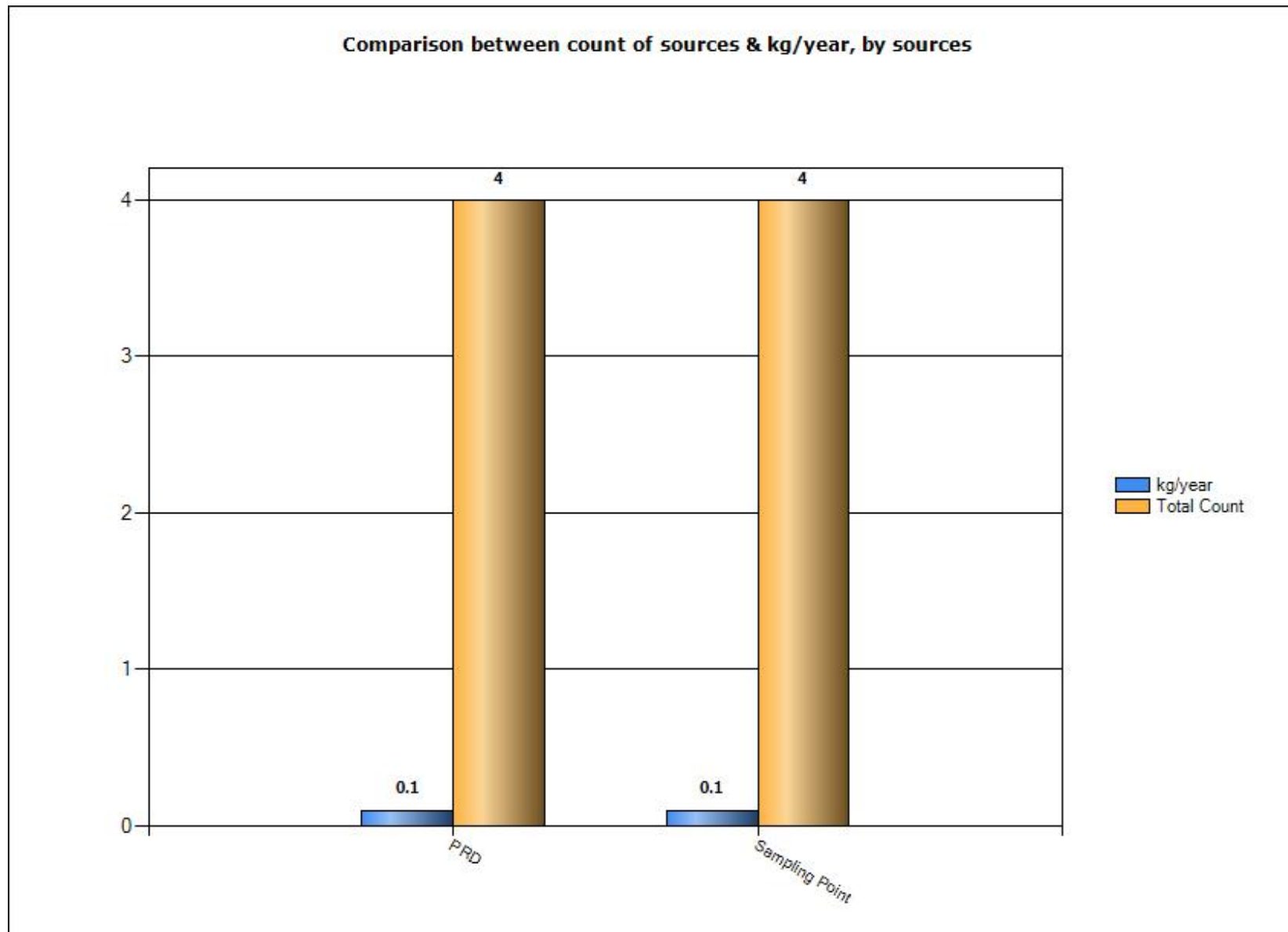
Comparison between count of sources & kg/year, by sources

Total overview by chemicals



Graph6.2.1 R6





Graph6.2.2 R6



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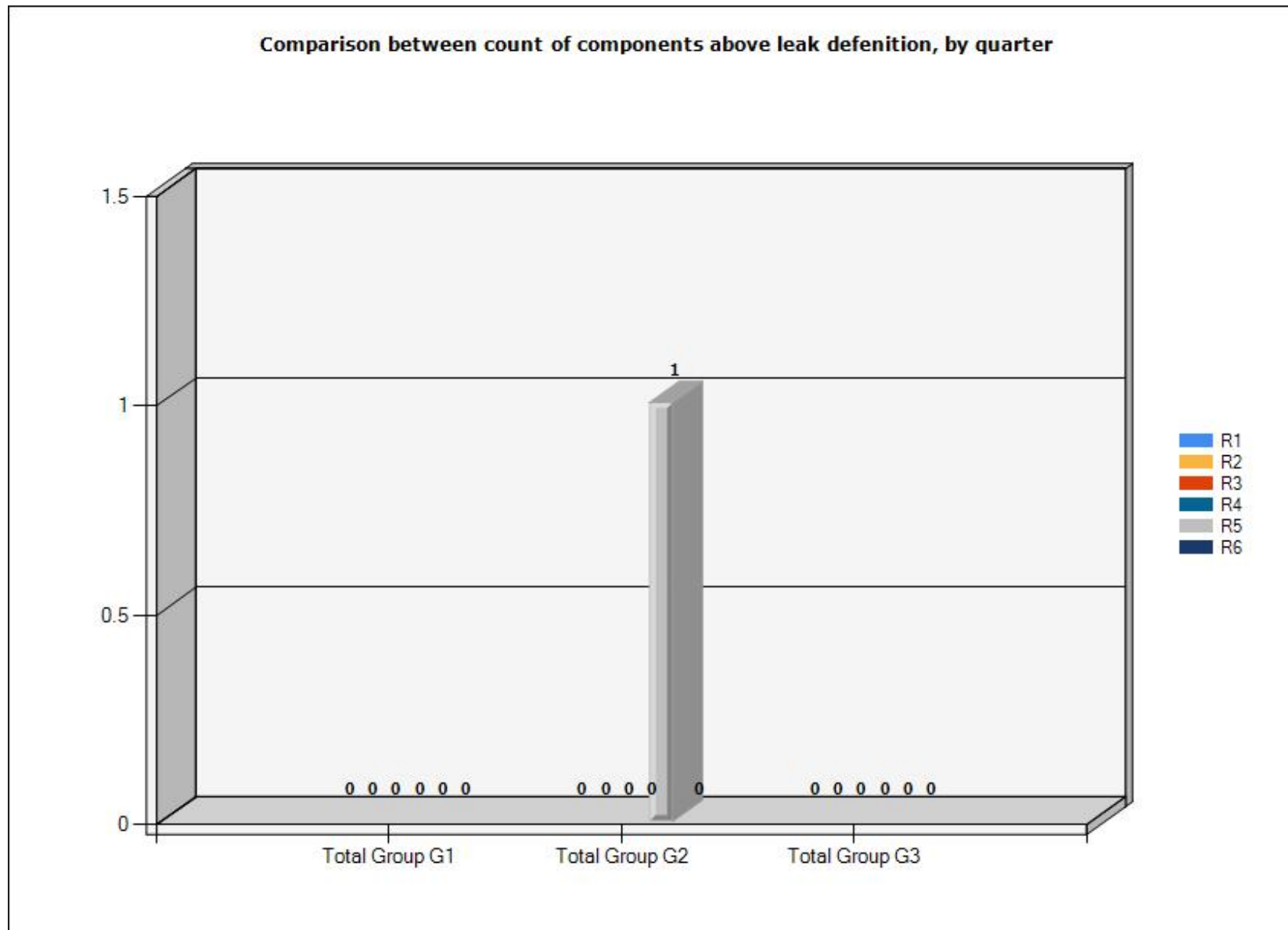
Graphs

Cumulative data for period 01/01/2018-31/12/2018

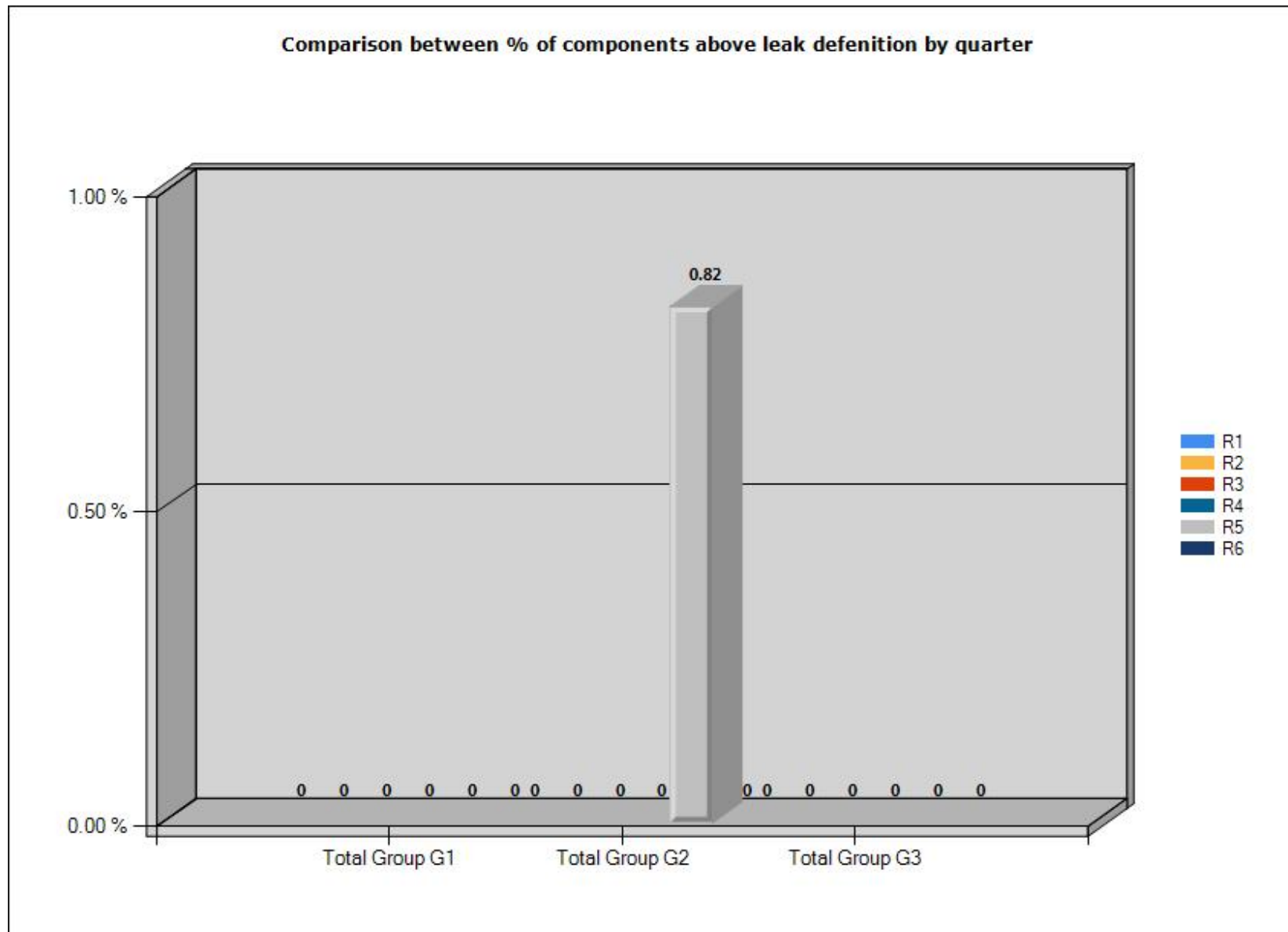
Comparison between count of sources & kg/year, by reading range

Comparison between count of sources & kg/year, by sources

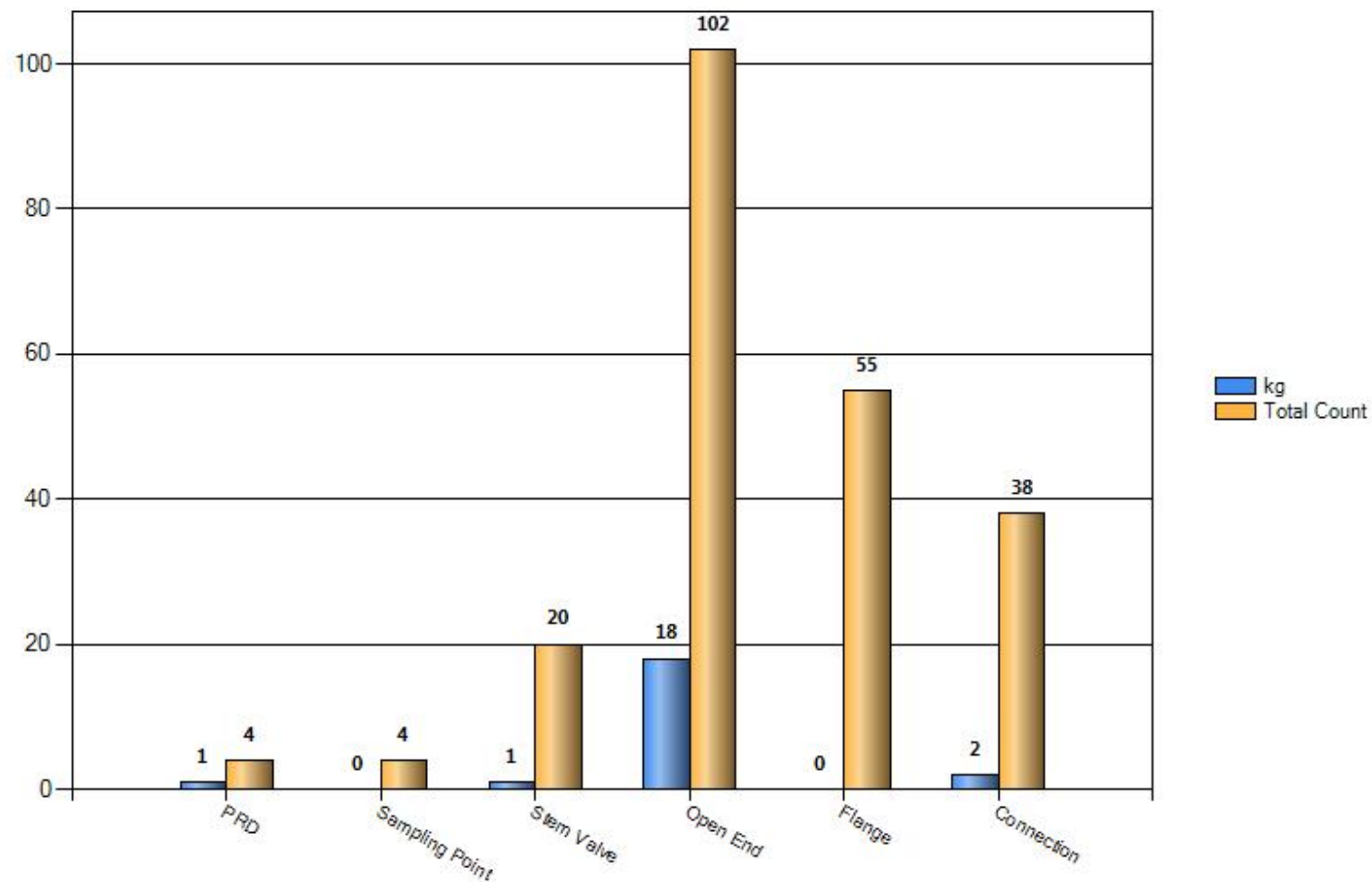
Total overview by chemicals

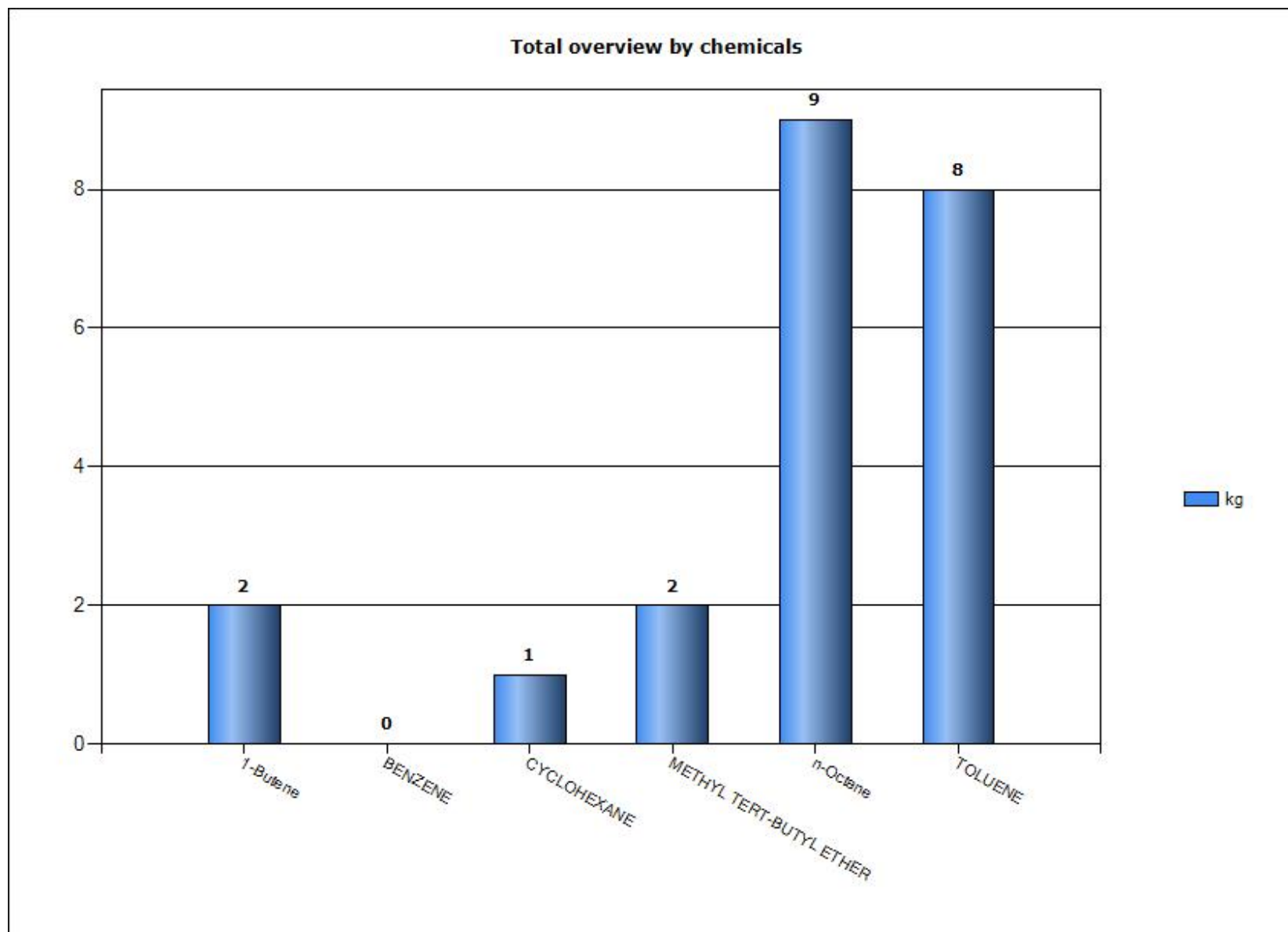


Graph6.3.1



Comparison between count of sources & kg, by sources





Graph6.3.4

General

Calibration loglist

Calibration gas certificates

Composition list & Response Factors

Quarterly production hours

Quarterly equipment check

Calibration log list

Plant	Round	Equipment Type	Analyzer Type	Ultra-Zero	Span Gas	Span gas Cylinder No	Span concentration ppm	Check gas	Check gas Cylinder No	Check gas concentration (A) ppm	Date	Equipment No	Equipment Serial No	Check			Calibration error (CP)	Result
														1-st check (A1) ppm	2-st check (A2) ppm	3-st check (A3) ppm		
TASHAN	1	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF51428	1,000	01-Mar-2018	5	202016061436	504	505	504	0.07%	OK
TASHAN	2	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	05-Mar-2018	2	0115248185	511	513	513	1.65%	OK
TASHAN	2	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	05-Mar-2018	3	0115248937	501	501	502	-0.53%	OK
TASHAN	2	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	19-Mar-2018	5	202016061436	511	510	510	1.26%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	16-May-2018	2	0115248185	500	493	499	-1.32%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	16-May-2018	5	202016061436	504	502	501	-0.33%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	17-May-2018	2	0115248185	503	504	504	-0.07%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	17-May-2018	5	202016061436	507	507	507	0.60%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	24-May-2018	5	202016061436	504	505	505	0.13%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	30-May-2018	5	202016061436	508	504	506	0.40%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	30-May-2018	2	0115248185	512	511	511	1.46%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	04-Jun-2018	3	0115248937	508	508	506	0.66%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	04-Jun-2018	5	202016061436	504	504	505	0.07%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	12-Jun-2018	1	0715622657	502	500	497	-0.86%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	12-Jun-2018	3	0115248937	505	502	500	-0.33%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	13-Jun-2018	3	0115248937	507	509	509	0.86%	OK
TASHAN	4	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	20-Aug-2018	1	0715622657	496	498	500	-1.19%	OK
TASHAN	4	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	21-Aug-2018	1	0715622657	499	501	500	-0.79%	OK
TASHAN	4	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	06-Sep-2018	3	0115248937	489	502	503	-1.19%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	29-Nov-2018	2	0115248185	502	501	501	-0.53%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	29-Nov-2018	3	0115248937	500	499	500	-0.86%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	02-Dec-2018	2	0115248185	503	502	502	-0.33%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	02-Dec-2018	3	0115248937	499	500	501	-0.79%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	03-Dec-2018	3	0115248937	487	498	497	-1.98%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	03-Dec-2018	2	0115248185	500	499	502	-0.73%	OK
TASHAN	6	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	16-Dec-2018	5	202016061436	504	505	505	0.13%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	25-Dec-2018	3	0115248937	498	499	498	-1.12%	OK
TASHAN	5	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	13-Jan-2019	5	202016061436	505	505	505	0.20%	OK

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number: X02AI99C33AC035
Cylinder Number: FF524456
Laboratory: 124 - Riverton - NJ
Analysis Date: Oct 07, 2016
Lot Number: 82-124579671-1

Customer PO Number:
Reference Number:
Cylinder Volume:
Cylinder Pressure:
Valve Outlet:

Airgas USA, LLC

Airgas Specialty Gases
600 Union Landing Road
Cinnaminson, NJ 08077
856-829-7878 Fax: 856-829-6576
Airgas.com

6867
82-124579671-1
30.3 Cubic Feet
2100 PSIG
590

Expiration Date: Oct 07, 2024

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
METHANE	500.0 PPM	504.0 PPM	+/- 2%
AIR	Balance		



C. M. [Signature]
Approved for Release

Page 1 of 82-124579671-1

Airgas
an Air Liquide company

15/11/17

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS **Grade of Product: CERTIFIED STANDARD-SPEC**

Part Number:	X02AI99C33AC027	Reference Number:	160-400903476-1
Cylinder Number:	FF51428	Cylinder Volume:	32.0 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Apr 27, 2017	Valve Outlet:	590
Lot Number:	160-400903476-1		

Expiration Date: Apr 27, 2025

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
METHANE	1000 PPM	1000 PPM	+/- 2%
AIR	Balance		

Notes: Gross Wt. 9.27 KG Tare Wt. 8.13 KG Net Wt. 1.14 KG



[Signature]
Approved for Release

Page 1 of 160-400903476-1

Stream Composition Summary

Stream Name	Stream Content	Stream Content Dates	TVA	MiniRAE 10.6	MiniRAE 11.7
Gasoline	TOLUENE-34 %, n-Octane-40 %, METHYL TERT-BUTYL ETHER-10 %, CYCLOHEXANE-5 %, BENZENE-1 %, 1-Butene-10 %		A=0.42, B=0.29		
Petroleum	TOLUENE-7.5 %, n-Octane-55.3 %, CYCLOHEXANE-35.2 %, BENZENE-2 %		A=0.39, B=0.31		

Quarterly Validation of LDAR Devices

Date: 28-Dec-2017			Quarter: 1				Sampling Flow Rate Check		Accuracy Check										Response Time					Comparison between two Devices				
Equipment No	Equip.Ser. No	Equipment Type	Anlyzer Type	Span Gas	Span gas Cylinder No	Span Gas Concentration ppm	Sampling Flow Rate l/min	Result	Check Gas	Check gas Cylinder No	Check Gas Concentration ppm	1-st check	2nd check	3rd check	Calibration error	Result	90% of Span ppm	Response Time 1 sec	Response Time 2 sec	Response Time 3 sec	Result	Instrument Reading	Second Device Reading	Difference ppm	Difference %	Result		
1	0715622657	TVA1000B	FID	Methane	FF51428	1,000	1.1	OK	Methane	FF524456	504	492	490	486	-2.91%	OK	900	3	3	3	OK	1.94	1.8	0.14	-7.78%	OK		
2	0115248185	TVA1000B	FID	Methane	FF51428	1,000	0.99	OK	Methane	FF524456	504	501	501	502	-0.53%	OK	900	4	4	4	OK	1.62	1.74	-0.12	6.9%	OK		
3	0115248937	TVA1000B	FID	Methane	FF51428	1,000	1.25	OK	Methane	FF524456	504	489	486	486	-3.37%	OK	900	3	3	3	OK	1.8	1.94	-0.14	7.22%	OK		
5	202016061436	TVA2020	FID	Methane	FF51428	1,000	0.96	OK	Methane	FF524456	504	481	479	479	-4.83%	OK	900	3	3	3	OK	1.74	1.8	-0.06	3.33%	OK		
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.51	OK	Isobutylene	EA0009962	997	996	996	997	-0.15%	OK	898	4	4	4	OK	1.88	1.68	0.2	-11.9%	OK		

Quarterly Validation of LDAR Devices

Date: 04-Apr-2018			Quarter: 2			Sampling Flow Rate Check		Accuracy Check										Response Time					Comparison between two Devices				
Equipment No	Equip.Ser. No	Equipment Type	Anlyzer Type	Span Gas	Span gas Cylinder No	Span Gas Concentration ppm	Sampling Flow Rate l/min	Result	Check Gas	Check gas Cylinder No	Check Gas Concentration ppm	1-st check	2nd check	3rd check	Calibration error	Result	90% of Span ppm	Response Time 1 sec	Response Time 2 sec	Response Time 3 sec	Result	Instrument Reading	Second Device Reading	Difference ppm	Difference %	Result	
1	0715622657	TVA1000B	FID	Methane	FF51430	1,000	1.01	OK	Methane	FF524456	504	508	508	507	0.73%	OK	900	3	3	3	OK	1.12	1.22	-0.1	8.2%	OK	
2	0115248185	TVA1000B	FID	Methane	FF51430	1,000	1.09	OK	Methane	FF524456	504	511	512	512	1.52%	OK	900	3	3	3	OK	1.18	1.3	-0.12	9.23%	OK	
3	0115248937	TVA1000B	FID	Methane	FF51430	1,000	0.96	OK	Methane	FF524456	504	506	504	504	0.13%	OK	900	3	3	3	OK	1.22	1.12	0.1	-8.93%	OK	
5	202016061436	TVA2020	FID	Methane	FF51430	1,000	1.01	OK	Methane	FF524456	504	513	512	512	1.65%	OK	900	3	3	3	OK	1.3	1.22	0.08	-6.56%	OK	
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.5	OK	Isobutylene	EA0009962	997	995	995	995	-0.28%	OK	898	4	4	4	OK	1.15	1.3	-0.15	11.54%	OK	

Quarterly Validation of LDAR Devices

Date: 04-Jul-2018		Quarter: 3				Sampling Flow Rate Check		Accuracy Check										Response Time					Comparison between two Devices				
Equipment No	Equip.Ser. No	Equipment Type	Anlyzer Type	Span Gas	Span gas Cylinder No	Span Gas Concentration ppm	Sampling Flow Rate l/min	Result	Check Gas	Check gas Cylinder No	Check Gas Concentration ppm	1-st check	2nd check	3rd check	Calibration error	Result	90% of Span ppm	Response Time 1 sec	Response Time 2 sec	Response Time 3 sec	Result	Instrument Reading	Second Device Reading	Difference ppm	Difference %	Result	
1	0715622657	TVA1000B	FID	Methane	FF51430	1,000	1.06	OK	Methane	FF524456	504	503	504	503	-0.13%	OK	900	3	3	3	OK	2.85	2.44	0.41	-16.8%	OK	
2	0115248185	TVA1000B	FID	Methane	FF51430	1,000	0.97	OK	Methane	FF524456	504	504	505	503	0%	OK	900	3	3	3	OK	1.18	1.22	-0.04	3.28%	OK	
3	0115248937	TVA1000B	FID	Methane	FF51430	1,000	1.23	OK	Methane	FF524456	504	502	503	503	-0.26%	OK	900	3	3	3	OK	2.15	2.61	-0.46	17.62%	OK	
5	202016061436	TVA2020	FID	Methane	FF51430	1,000	0.95	OK	Methane	FF524456	504	506	503	505	0.13%	OK	900	3	3	3	OK	3.41	3.05	0.36	-11.8%	OK	
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.5	OK	Isobutylene	EA0009962	997	997	996	996	-0.15%	OK	898	4	4	3	OK	2.5	2.1	0.4	-19.05%	OK	

Quarterly Validation of LDAR Devices

Date: 02-Oct-2018			Quarter: 4				Sampling Flow Rate Check		Accuracy Check										Response Time					Comparison between two Devices				
Equipment No	Equip.Ser. No	Equipment Type	Anlyzer Type	Span Gas	Span gas Cylinder No	Span Gas Concentration ppm	Sampling Flow Rate l/min	Result	Check Gas	Check gas Cylinder No	Check Gas Concentration ppm	1-st check	2nd check	3rd check	Calibration error	Result	90% of Span ppm	Response Time 1 sec	Response Time 2 sec	Response Time 3 sec	Result	Instrument Reading	Second Device Reading	Difference ppm	Difference %	Result		
1	0715622657	TVA1000B	FID	Methane	FF51430	1,000	0.96	OK	Methane	FF524456	504	495	494	494	-1.92%	OK	900	4	4	4	OK	1.55	1.48	0.07	-4.73%	OK		
2	0115248185	TVA1000B	FID	Methane	FF51430	1,000	1.31	OK	Methane	FF524456	504	491	492	492	-2.45%	OK	900	4	4	4	OK	1.79	1.82	-0.03	1.65%	OK		
3	0115248937	TVA1000B	FID	Methane	FF51430	1,000	1.4	OK	Methane	FF524456	504	506	507	506	0.46%	OK	900	3	4	4	OK	1.99	1.95	0.04	-2.05%	OK		
5	202016061436	TVA2020	FID	Methane	FF51430	1,000	1.02	OK	Methane	FF524456	504	518	518	518	2.78%	OK	900	3	3	3	OK	1.52	1.59	-0.07	4.4%	OK		
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.51	OK	Isobutylene	EA0009962	997	996	995	995	-0.25%	OK	898	4	4	4	OK	2.5	2.1	0.4	-19.05%	OK		

CUMULATIVE PRODUCTION HOURS TEMPLATE 2018

Plant TASHAN

Unit	Drawing	Stream Name	Remark	Annual Production Hours	Q1	Q2	Q3	Q4
					01/01-31/03	01/04-30/06	01/07-30/09	01/10-31/12
					Quarter =	Quarter =	Quarter =	Quarter =
					Quarterly Production hours	Quarterly Production hours	Quarterly Production hours	Quarterly Production hours
Alroy	6006-100-006	Gasoline		8,760	2,190	2,190	2,190	2,190
Alroy	6006-100-007	Gasoline		8,760	2,190	2,190	2,190	2,190

נספח ג'

דוגמת חישוב עבור מיכל גג חיצוני צף מס' 2 המאחסן קרוסין

3013.15-034-T2

3013.15-025

T2 - kerosene

External Floating roof

1. Tank data

Diameter of the tank	D	m	Tank data	48.77	
		feet	---	160.01	
Effective height of the stock liquid (while roof landing episode)	h_{le}	m	Tank data		
		feet	---	11.00	
Shell Color and condition	α	color	חאקי	0.89	Table 7.1-6
		condition	טובה		Assumption - Green Dark
Roof color and condition	α	color	לבן	0.17	Table 7.1-6
		condition	טוב		
Tank paint solar absorptance	α	dimensionless		0.53	Table 7.1-6
Vapor space outage (while roof landing episode)	H_{VO}	m	assumption - equal to legs height		Possible to use also equation 1-15
		feet		11.00	
Volume of the vapor space (while roof landing episode)	V_V	ft ³	$V_V = \pi(D/2)^2 H_{VO}$	221,185	Equation 1-3
Breather vent pressure setting	ΔP_{BP}	psi	Typical value	0.50	Equation 1-11
Breather vent vacuum setting	ΔP_{BV}	psi	Typical value	0.00	Equation 1-11
Breather vent pressure setting range	ΔP_B	psi	$\Delta P_B = P_{BP} - P_{BV}$	0.50	Equation 1-11

2. Material data - קרוסין

Stock vapor molecular weight	M_V	gr/gr-mole lb/lb-mole	msds data	130	
Density of the liquid inside the tank	W_l	g/ml lb/gal	msds data	0.80	0
			---	6.68	
Vapor density	W_V	kg/m ³ lb/ft ³	msds data	4.5	
			---	0.28	
True vapor pressure of the stock liquid	P	mm Hg	PEI data	0.833	at 20 °C
		psia	---	0.02	
Vapor pressure at daily average liquid surface temperature	P_{VA}	psia	הנחה: $P_v = nRT \rightarrow$ $P_2 = P_1 \cdot (T_2/T_1)$	0.02	
Vapor pressure at the daily maximum liquid surface temperature, psia	P_{VX}	psia		0.02	
Vapor pressure at the daily minimum liquid surface temperature	P_{VN}	psia	$T_1(k) = 20C + 273$ $T_2(k) = 37.5C + 273$	0.02	
Daily vapor pressure range	ΔP_V	psia	$\Delta P_V = P_{VX} - P_{VN}$	0.00	Equation 1-9

3. Operation data

Number of days that the tank stands idle (on roof landing episode)	n_d	days/landing episode	site data	4	
Number of degassing and cleaning episode		landing episode/year	site data	0.07	
Number of roof landing episode		landing episode/year	site data	0.07	

4. Normal operation (Tanks program)

Working (withdrawal) losses		lb per year	Tanks Program	73	T2 - B&W 2018
		Kg per year	---	33	
Total emissions (Breathing & Working)		lb per year	Tanks Program	119	T2 - B&W 2018
		Kg per year	---	54	
Breathing (standing) losses		Kg per year		21	

5. Degassing and Cleaning (Tanks program)

Degassing: emission from one turnover of floating roof	$E_{\text{degass-floating}}$	lb per emptying	Tanks Program	60.05	T2 - DFloating 2018
		Kg per emptying	---	27	
Degassing: fixed roof with a height of roof legs	$E_{\text{degass-legs}}$	lb per emptying	Tanks Program	67	T2- DFixed 2018 (Only working losses)
		Kg per emptying	---	30	
Liquid fraction in sludge	F_{liquid}			0.8	Tanks FAQ - degassing and cleaning
Sludge volume	V_s	m3 per emptying		70	
Sludge weight	W_s	Kg per emptying		56,000	
Cleaning emissions	E_{cleaning}	lb per emptying	$E_{\text{cleaning}} = W_s * (1 - F_{\text{liquid}})$	24,692	
		Kg per emptying		11,200	
Total Degassing and Cleaning emissions	$E_{\text{degass-total}}$	lb per emptying	$E_{\text{degass-total}} = E_{\text{degass-floating}} + E_{\text{degass-legs}} + E_{\text{cleaning}}$	24,818	
		Kg per emptying		11,257	

6. Roof landing

Daily average liquid surface temperature	T_{LA}	°R	$T_{LA} = 0.44T_{AA} + 0.56T_B + 0.0079 * \alpha * I$	541.74	Equation 1-26
Daily vapor temperature range	ΔT_V	°R	$\Delta T_V = 0.72\Delta T_A + 0.028 * \alpha * I$	56.73	Equation 1-8
Daily maximum liquid surface temperature	T_{LX}	°R	$T_{LX} = T_{LA} + 0.25\Delta T_V$	555.92	Figure 7.1-17
Daily minimum liquid surface temperature	T_{LN}	°R	$T_{LN} = T_{LA} - 0.25\Delta T_V$	527.56	Figure 7.1-17
Liquid bulk temperature	T_B	°R	$T_B = T_{AA} + 6\alpha - 1$	530.06	Equation 1-28
Max standing idle losses during roof landing	L_{SL-max}	lb per landing episode	$L_{SL-max} = 5.9D^2h_{le}W_I$	11,093,038	Equation 2-13
		Kg per landing episode	---	5,031,769	
Filling saturation factor	S	dimensionless	0.60 for a full liquid heel 0.50 for a partial 0.15 for drain-dry	0.50	Equation 2-26 (pages No 33,35)
saturation factor	K_S	dimensionless	$K_S = \frac{1}{1 + 0.053 * P_{VA} * H_{VO}}$	0.5	Equation 1-20 <i>KS is assumed to be less than or equal to the saturation factor during filling (S).</i>
Vapor space expansion factor	K_E	dimensionless	$K_E = \frac{\Delta T_V}{T_{LA}} + \frac{\Delta P_V - \Delta P_B}{P_A - P_{VA}}$	0.071	Liquid stock has a true vapor pressure greater than 0.1psia - Equation 1-7.
Standing idle losses during roof landing	L_{SL}	lb per landing episode	$L_{SL} = n_d K_E \left(\frac{PV_V}{RT_{AA}} \right) M_V K_S$	12	Equation 2-16
Filling losses during roof landing	L_{FL}	lb per landing episode	$L_{FL} = \left(\frac{P * V_V}{R * T_{AA}} \right) M_V * S$	41	Equation 2-26
Total losses during roof landing	L_{TL}	lb per landing episode	$L_{TL} = L_{SL} + L_{FL}$	52	Equation 2-10
		Kg per landing episode		24	

7. Summary

Working (withdrawal) losses		Kg per year		33	
Breathing (standing) losses		Kg per year		21	
Total Degassing and Cleaning emissions		Kg per year		750	
Total losses during roof landing		Kg per year		2	
				806	Kg per year

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	T2 - B&W 2018
City:	Haifa
State:	Israel
Company:	PEI
Type of Tank:	External Floating Roof Tank
Description:	kerosene

Tank Dimensions

Diameter (ft):	160.01
Volume (gallons):	7,599,816.00
Turnovers:	1.30

Paint Characteristics

Internal Shell Condition:	Dense Rust
Shell Color/Shade:	Red/Primer
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Fitting/Status**Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	3
Slotted Guide-Pole/Sample Well/Gask Sliding Covr, w. Float,Sleeve,Wiper	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	29
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	43
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Haifa, Israel (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T2 - B&W 2018 - External Floating Roof Tank
Haifa, Israel

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Jet kerosene	All	81.75	66.81	96.69	70.60	0.0161	N/A	N/A	130.0000			162.00	Option 1: VP70 = .011 VP80 = .015

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T2 - B&W 2018 - External Floating Roof Tank
Haifa, Israel

Annual Emission Calculations	
Rim Seal Losses (lb):	40.6796
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph) ⁿ):	0.3000
Average Wind Speed (mph):	6.2000
Seal-related Wind Speed Exponent:	1.6000
Value of Vapor Pressure Function:	0.0003
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0161
Tank Diameter (ft):	160.0100
Vapor Molecular Weight (lb/lb-mole):	130.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	72.8711
Annual Net Throughput (gal/yr.):	9,891,924.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0075
Average Organic Liquid Density (lb/gal):	7.0000
Tank Diameter (ft):	160.0100
Roof Fitting Losses (lb):	5.3380
Value of Vapor Pressure Function:	0.0003
Vapor Molecular Weight (lb/lb-mole):	130.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact. (lb-mole/yr):	150.3024
Average Wind Speed (mph):	6.2000

Total Losses (lb): 118.8887

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph ⁿ n))		
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	3	1.60	0.00	0.00	0.1705
Slotted Guide-Pole/Sample Well/Gask Sliding Covr. w. Float-Sleeve,Wiper	1	11.00	9.90	0.89	1.6891
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2	6.20	1.20	0.94	0.7791
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	29	1.20	0.14	0.65	1.6103
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	43	0.49	0.16	0.14	1.0484
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	0.0406

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T2 - B&W 2018 - External Floating Roof Tank
Haifa, Israel

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Jet kerosene	40.68	72.87	5.34	0.00	118.89

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	T2 - DFixed 2018
City:	Haifa
State:	Israel
Company:	PEI
Type of Tank:	Vertical Fixed Roof Tank
Description:	kerosene

Tank Dimensions

Shell Height (ft):	11.00
Diameter (ft):	160.01
Liquid Height (ft) :	11.00
Avg. Liquid Height (ft):	5.50
Volume (gallons):	1,654,664.74
Turnovers:	1.00
Net Throughput(gal/yr):	1,654,664.74
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.00

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.50

Meterological Data used in Emissions Calculations: Haifa, Israel (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T2 - DFixed 2018 - Vertical Fixed Roof Tank
Haifa, Israel

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T2 - DFixed 2018 - Vertical Fixed Roof Tank
Haifa, Israel

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet kerosene	66.66	51.50	118.16

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	T2 - DFloating 2018
City:	Haifa
State:	Israel
Company:	PEI
Type of Tank:	External Floating Roof Tank
Description:	kerosene

Tank Dimensions

Diameter (ft):	160.01
Volume (gallons):	7,599,816.00
Turnovers:	1.00

Paint Characteristics

Internal Shell Condition:	Dense Rust
Shell Color/Shade:	Red/Primer
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Fitting/Status**Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	3
Slotted Guide-Pole/Sample Well/Gask Sliding Covr, w. Float,Sleeve,Wiper	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	29
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	43
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Haifa, Israel (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T2 - DFloating 2018 - External Floating Roof Tank
Haifa, Israel

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T2 - DFloating 2018 - External Floating Roof Tank
Haifa, Israel

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Jet kerosene	3.60	55.99	0.46	0.00	60.05

נספח ד'

דוגמת חישוב עבור זרוע מילוי עילי טבול מס' 1 של קרוסין

3013.15-035

Transportation - Loading losses

Loading arm #1 - Kerosene

Density	W_l	g/ml	msds data	0.80	
Tank paint solar absorptance	α	dimensionless	site data	0.41	
Daily average ambient temperature	T_{AA}	°R	"Site" tab @ 3013-037	525.97	
Yearly consumption	M_{year}	ton	---	1,642	
		m ³	data	2,066	
		gal	---	545,780	
Cargo tank volume	V	m ³	data	30.0	
		gal	---	7,925	
Number of tank trucks	N_{trucks}	1/year	$N_{trucks} = M_{year} / V$	69	
Duration of road truck filling	t	min	data	30	
Saturation factor	S	dimensionless	Submerge loading, dedicated normal service	0.6	Table 5.2-1
True vapor pressure of liquid	P	mmHg		0.833	@ 20 °C
		psia		0.02	
Molecular weight of vapors	M	lb/lb-mole		130	Table 7.1-2
Temperature of bulk liquid loaded	$T = T_B$	°R	$T = T_B = T_{AA} + 6\alpha - 1$	527.40	Equation 1-28
Controlled efficiency for the recovery unit (vapor recovery efficiency)	$eff1$	%		0	page 5.2-6 can be 90% to over 99%
vapor collection efficiency	$eff2$	%	Truck passed the NSPS-level annual test	70.0	page 5.2-6 99.2- for tanker truck passed the MACT-level annual leak test 98.7- for truck passed the NSPS-level annual test 70 - for trucks not passing one of these leak tests
overall reduction efficiency	eff	%	$eff = eff1 * eff2 / 100$	0	
Loading losses of petroleum liquids (uncontrolled emission rate)	L_L	lb/10 ³ gal loaded	$L_L = 12.46 \frac{S * P * M}{T} \left(1 - \frac{eff}{100} \right)$	0.030	Page 5.2-4 Equation 1
Total loading losses of petroleum	$L_L \text{ total}$	lb / loading	$L_L \text{ total} = L_L * V$	0.24	
Flow rate of pollutant emission during loading	Q	lb / min	$Q = L_L \text{ total} / t$	0.008	
		Kg / min	---	0.004	
		Kg / hr	---	0.21	
Annual pollutant emission during loading	E_{total}	Kg / year	$E_{total} = L_L \text{ total} * N_{trucks}$	7.36	
Average pollutant emission concentration during loading	C	gr / m ³	$C = Q * t / V$	3.6	Assumption: the mass of the pollutant is contained in the air volume inside the tanker which is replaced by the liquid loaded

נספח ה'

חישוב פליטות ממיכל לאיסוף תשטיפים

תוכנת Tanks : חישוב פליטה כתוצאה מאחסון ושינוי מפלס

Horizontal Tank
Haifa, Israel

TANKS 4.0 Emissions Report - Detail Format Tank Identification and Physical Characteristics

Identification

User Identification: Runoff_Tank -Breathing&Working
City: Haifa
State: Israel
Company: PEI
Type of Tank: Horizontal Tank
Description: 60m3

Tank Dimensions

Shell Length (ft): 62.34
Diameter (ft): 6.56
Volume (gallons): 13,208.60
Turnovers: 3.00
Net Throughput (gal/yr): 39,625.80
Is Tank Heated (y/n): N
Is Tank Underground (y/n): Y

Paint Characteristics

Shell Color/Shade: White/White
Shell Condition:

Breather Vent Settings

Vacuum Settings (psig): 0.00
Pressure Settings (psig): 0.00

Meteorological Data used in Emissions Calculations: Haifa, Israel (Avg Atmospheric Pressure = 14.69 psia)

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Page 1



TANKS 4.0 Emissions Report - Detail Format Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Jet kerosene	All	65.70	65.70	65.70	65.26	0.0099	0.0099	0.0099	130.0000			162.00	Option 5: A=12.39, B=8933

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Page 2

TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

Annual Emission Calculations	
No Standing Losses: Underground Tank	
Working Losses (lb):	1.2166
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0099
Annual Net Throughput (gal/yr.):	39,625.8000
Annual Turnovers:	3.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	6.5600
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.2166

TANKS 4.0
Emissions Report - Detail Format
Individual Tank Emission Totals

Annual Emissions Report

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Jet kerosene	1.22	0.00	1.22

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תוכנת Tanks : חישוב פליטה כתוצאה מניקוי וריקון מיכל (שלב א')

Horizontal Tank
Haifa, Israel

TANKS 4.0 Emissions Report - Detail Format Tank Identification and Physical Characteristics

Identification

User Identification: Runoff_ tank-Degassing fixed
City: Haifa
State: Israel
Company: PEI
Type of Tank: Horizontal Tank
Description: Kerosene 60m3

Tank Dimensions

Shell Length (ft): 62.34
Diameter (ft): 6.56
Volume (gallons): 13,208.60
Turnovers: 1.00
Net Throughput (gal/yr): 13,208.60
Is Tank Heated (y/n): N
Is Tank Underground (y/n): Y

Paint Characteristics

Shell Color/Shade: White/White
Shell Condition:

Breather Vent Settings

Vacuum Settings (psig): 0.00
Pressure Settings (psig): 0.00

Meteorological Data used in Emissions Calculations: Haifa, Israel (Avg Atmospheric Pressure = 14.69 psia)

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TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

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TANKS 4.0
Emissions Report - Detail Format
Individual Tank Emission Totals

Annual Emissions Report

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Jet kerosene	0.39	0.00	0.39

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תוכנת Tanks : חישוב פליטה כתוצאה מניקוי וריקון מיכל (שלב ב')

Internal Floating Roof Tank
Haifa, Israel

TANKS 4.0 Emissions Report - Detail Format Tank Identification and Physical Characteristics

Identification

User Identification: Runoff_Tank - Degassing floating
City: Haifa
State: Israel
Company: gadot east
Type of Tank: Internal Floating Roof Tank
Description: Kerosene - 60m3

Tank Dimensions

Diameter (ft): 22.82
Volume (gallons): 13,208.60
Turnovers: 1.00
Self Supp. Roof? (y/n): Y
No. of Columns: 0.00
Eff. Col. Diam. (ft): 0.00

Paint Characteristics

Internal Shell Condition: Light Rust
Shell Color/Shade: White/White
Shell Condition: Good
Roof Color/Shade: White/White
Roof Condition: Good

Rim-Seal System

Primary Seal: Mechanical Shoe
Secondary Seal: None

Deck Characteristics

Deck Fitting Category: Typical
Deck Type: Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	9
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meteorological Data used in Emissions Calculations: Haifa, Israel (Avg Atmospheric Pressure = 14.69 psia)

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TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

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TANKS 4.0
Emissions Report - Detail Format
Individual Tank Emission Totals

Annual Emissions Report

Components	Losses(lbs)				Total Emissions
	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	
Jet kerosene	0.26	0.14	0.27	0.00	0.67

חישובי פליטה ממיכל תשטיפים

מיכל תשטיפים - 60 מ³ - קרוסין

עבור כל החישובים הופו כי נפלט קרוסין בתהליך התהליך

Horizontal tank

1. Tank & Operation data

Diameter of the tank	D	m	site data	2	
		feet		6.56	
Length of the shell	L	m	site data	19	
		feet		62.34	
Effective tank diameter (for floating roof scenario)		feet	$D_e = \sqrt{\frac{L \cdot D}{4}}$	22.82	EPA-42, page 7.1-14, eq. 1-3
Tank paint solar absorptance	α	dimensionless	Gray shell & roof Paint Shade or Type: medium gray. Paint Condition: good	0.17	Table 7.1-6
Number of degassing and cleaning episode		landing episode/year	site data	0.05	
Density of the liquid inside the tank	W_l	g/ml	msds data	0.80	
Liquid bulk temperature	T_B	°R	$T_B = T_{AA} + 6\alpha - 1$	525.99	Equation 1-28
		°C		19.05	

2. Normal operation (Tanks program)

Working losses		lb per year	Tanks Program	1.22	פליטה ממכל תשטיפים breathing&working losses
		Kg per year		0.55	
Breathing losses		lb per year	Tanks Program	0	פליטה ממכל תשטיפים breathing&working losses
		Kg per year		0.00	

3. Degassing and Cleaning (Tanks program)

Degassing: emission from one turnover	$E_{degass-floating}$	lb per emptying	Tanks Program	0.39	פליטה ממכל תשטיפים Degassing fixed
		Kg per emptying		0.18	
Degassing: floating roof, 1 turnover	$E_{degass-roofs}$	lb per emptying	Tanks Program	0.67	פליטה ממכל תשטיפים Degassing floating
		Kg per emptying		0	
Liquid fraction in sludge	F_{liquid}			0.9	Tanks FAQ - degassing and cleaning
Sludge weight	W_s	Kg per emptying	Distillate has no sludge	0	
Cleaning emissions	$E_{cleaning}$	lb per emptying	$E_{cleaning} = W_s * (1 - F_{liquid})$	0	
		Kg per emptying		0	
Total Degassing and Cleaning emissions	$E_{degass-total}$	lb per emptying	$E_{degass-total} = E_{degass-floating} + E_{degass-roofs} + E_{cleaning}$	1	
		Kg per emptying		0	

4. Summary

Working losses		Kg per year	1	
Breathing losses		Kg per year	0.00	
Total Degassing and Cleaning emissions		Kg per year	0.02	
			1	Kg per year

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גיליון חישוב זה הוכן על ידי "פז" הנדסה וניהול (1980) בע"מ.

אין להעתיק ואז לעשות שימוש כלשהו במידע הנ"ל ללא הרשאה כתובה מ"פז" הנדסה וניהול (1980) בע"מ.