

תשתיות נפט ואנרגיה בע"מ

מסוף אלרואי

סיכום פליטות לאוויר שנת 2019

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נספחים

- נספח א' טבלה 1-5.2 (AP-42)
- נספח ב' נתוני ניטור LDAR עבור מסוף אלרואי – סיכום שנת 2019
- נספח ג' דוגמת חישוב עבור מיכל גג חיצוני צף מס' 2 המאחסן קרוסין
- נספח ד' חישוב פליטות ממיכל לאיסוף תשטיפים

אביטל בלניק	יואב פיסטינר	17.02.2020	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 6 מיכלים תפעוליים ו-3 מיכלים אסטרטגים (מיכלים מס' 1, 6 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 2019

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	0	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	10.5
2	קרוסין	0.833 @ 28°C	22,511	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	10
3	סולר	0.507 @ 28°C	30,507	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	9.5
4	סולר	0.507 @ 28°C	32,549	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	10.3
5	סולר	0.507 @ 28°C	12,286	גבעה מלאה	68.27	56,959	51,614	15.56	14.1	14.1
6 ⁽¹⁾	סולר	0.507 @ 28°C	0	גבעה מלאה	68.27	56,959	51,614	15.56	14.1	14.1
7	סולר	0.507 @ 28°C	46,565	גבעה מלאה	68.27	56,959	51,614	15.56	14.1	11.4
8 ⁽²⁾	קרוסין	0.833 @ 28°C	41,306	גבעה חלקית	48.8	36,547	34,228	19.54	18.3	18.3
9 ⁽¹⁾	קרוסין	0.833 @ 28°C	0	גבעה חלקית	48.77	32,056	28,768	17.16	15.4	9.7
סה"כ			185,724			367,704	332,913			

(1) מכלים מס' 1, 6 ו-9 משמשים כמכלי מלאי, לא היו תנועות במכלים בשנת 2019.

(2) מכל 8 עבר חידוש צביעת גג בפברואר 2019, והחלפת אטם ראשוני מסוג Liquid mounted במרץ 2019.

טבלה 2: נתוני מעטפת וגגות – שנת 2019

מספר מיכל	סוג גג	אטם ראשי	אטם משני	צורת גג	סוג חיבורי גג	צבע גג	מצב צבע גג	מצב 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	חום	טוב	מרותך	חלוד הרבה	לא
3	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	לבן	טוב	מרותך	חלוד הרבה	לא
4	גג צף חיצוני	Mechanical Shoe	Shoe mounted	Pontoon	מרותך	לבן	טוב	חום	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 2019

מספר מיכל	שובר ואקום			רגליים מתכווננות התומכות בגג צף ⁽¹⁾			Rim Vent	כמות בוצה בנקיון (מ"ק)	כמות מדי מפלס	הדיגום המחורצת ולרגלי הגג הצף ⁽¹⁾
	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		

⁽¹⁾ הנ"ל לא נלקחו בחשבון בחישוב הפליטות מתוכנת ה-TANKS מפני שנדגמו במסגרת ניטורי ה-LDAR.

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
חום	Brown	Aluminium/Diffuse
צהוב קרם	Beige/Cream	Aluminium/Specular
לבן	White	White

(*) 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 2019

מס' זרוע	מוצר	מילוי עילי/ תחת	נפח מילוי שנתי (מ"ק)	נפח ממוצע של מיכלית (מ"ק)
1	קרוסין	עילי טבול	0	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		0	

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:

$$\alpha_{\text{tank2}} = \frac{\alpha_{\text{roof}(2)} + \alpha_{\text{Shell}(2)}}{2} = \frac{0.17 + 0.58}{2} = 0.38$$

ב. בשלב השני חושב מקדם α ממוצע עבור הקרוסין:

$$\alpha_{\text{Kerosene}} = \frac{\alpha_{\text{tank}(2)} + \alpha_{\text{tank}(8)} + \alpha_{\text{tank}(9)}}{\text{number of kerosene tanks}} = \frac{0.38 + 0.43 + 0.26}{3} = 0.35$$

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 הונח 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 כנספח ג' 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 גוות 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 2019

4.1. מיכלים

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

טבלה 7: סיכום פליטות מכלים - שנת 2019

מיכל	חומר	פליטות לאוויר (ק"ג/שנה)
1	בנזין	3,603
2	קרוסין	788
3	סולר	38
4	סולר	826
5	סולר	1,701
6	סולר	1,693
7	סולר	1,723
8	קרוסין	792
9	קרוסין	758
	סה"כ	11,921

4.2. מסוף מילוי מיכליות כביש

עבור זרועות המילוי לא חושבו פליטות לשנת 2019, מאחר וזרועות המילוי לא פעלו במהלך השנה.

4.3. מיכל איסוף תשטיפים

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

חישוב מצורף בנספח ד'.

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 8: סיכום פליטות חומרים אורגניים נדיפים עבור רכיבים בשנת 2019

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

4.5. פליטה שנתית מכלל המתקן

טבלה 9: סיכום פליטות שנתי מכלל מסוף אלרואי – שנת 2019

סה"כ פליטות (ק"ג/שנה)				
סה"כ	סיכום פליטות רכיבים (LDAR)	מיכל לאיסוף תשטיפים	מסוף מילוי מיכליות כביש	חוות מיכלים
11,930	8	1	0	11,921

5. פליטות לא שגרתיות במהלך שנת 2019

במהלך שנת 2019 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 פיסי 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 2019

(מתוך דיווח שהתקבל ממעבדות אקולוגיה מתאריך 26.12.2019)

3013.16-006A

LDAR
Fugitive Emission Monitoring
Report No.
RL-TS-R-A-19

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

Report printing date: 26-Dec-2019

**Technicians names: Polik
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1 Project introduction

1.1 Scope of work

6 rounds of measurements (from 01/01/2019 to 31/12/2019)

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:

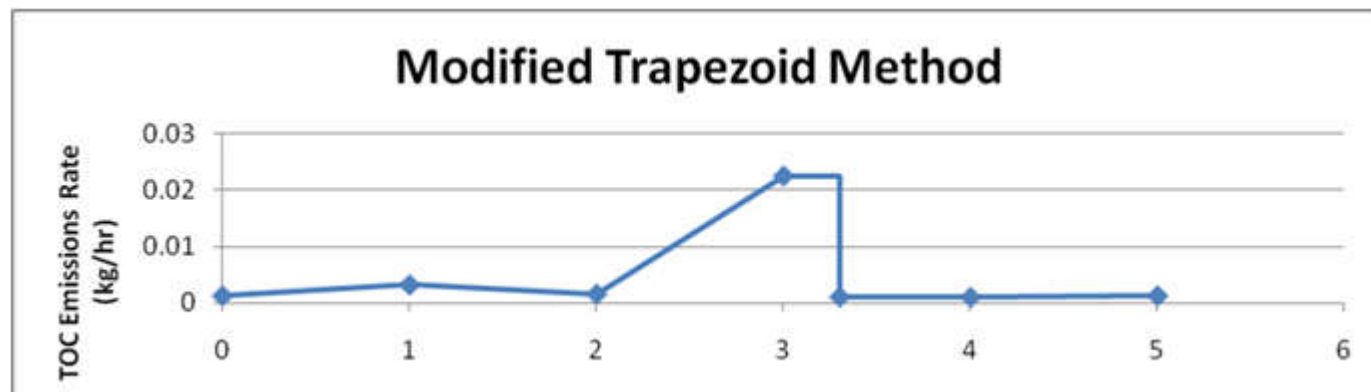
Measured ppm values are converted to emission loss (kg/year) and these calculations are based on the E.P.A. "Correlation method Refinery"

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

Equation Set	Class	Chemical State	Default Zero	Pegged 100k	Multiplier	Exponent	Avg. Factor
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: 01/01/2019-31/12/2019

The total emissions: **7.755kg**

Overview by component class

Component Class	Total Components count	Total Components above leak definition (1,000 ppm) count						% of components above leak definition (1,000 ppm) %						Unrepaired Components count						Total Emissions 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	01/01/2019- 31/12/2019	
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	0.14	
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	1.354	
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	1.494	
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	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	2.248	
Total Group 2:	122	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	3.615	
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	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0	7.755	

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%	7	87.5%	223	100.0%	8	100.0%	130	100.0%	8	100.0%
9-999 ppm	2	25.0%	1	12.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
1,000-100,000 ppm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	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%	0	0.0%	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
6.524 kg/year
6.734 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	2	0	0.00%	0	6.594
Total:	8	2	0	0.00%	0	6.734

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	3.12%	
9-999 ppm	2	25.00%	6.524	96.88%	
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%	6.734	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
6.524 kg/year
6.734 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	2	0	0.00%	0	6.594
Total:	8	2	0	0.00%	0	6.734

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	3.12%	
9-999 ppm	2	25.00%	6.524	96.88%	
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%	6.734	100%	

Summary of Monitoring Period Round 2

First measurement:

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

0.245 kg/year
3.515 kg/year
3.76 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	1	0	0.00%	0	3.62
Total:	8	1	0	0.00%	0	3.76

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	7	87.50%	0.245	6.52%	
9-999 ppm	1	12.50%	3.515	93.48%	
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%	3.76	100%	

Measurement after repair attempt:

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

0.245 kg/year
3.515 kg/year
3.76 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	1	0	0.00%	0	3.62
Total:	8	1	0	0.00%	0	3.76

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	7	87.50%	0.245	6.52%	
9-999 ppm	1	12.50%	3.515	93.48%	
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%	3.76	100%	

Summary of Monitoring Period Round 3

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

6.063 kg/year
0 kg/year
6.063 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	1.363
Open End	102	0	0	0.00%	0	1.782
Flange	55	0	0	0.00%	0	0.149
Connection	38	0	0	0.00%	0	2.49
Total:	223	0	0	0.00%	0	6.064

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	223	100.00%	6.063	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:	223	100%	6.063	100%	

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

6.063 kg/year
0 kg/year
6.063 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	1.363
Open End	102	0	0	0.00%	0	1.782
Flange	55	0	0	0.00%	0	0.149
Connection	38	0	0	0.00%	0	2.49
Total:	223	0	0	0.00%	0	6.064

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	223	100.00%	6.063	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:	223	100%	6.063	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:

0.283 kg/year
0 kg/year
0.283 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	0.141
Sampling Point	4	0	0	0.00%	0	0.141
Total:	8	0	0	0.00%	0	0.282

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%	0.283	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%	0.283	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:

0.283 kg/year
0 kg/year
0.283 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	0.141
Sampling Point	4	0	0	0.00%	0	0.141
Total:	8	0	0	0.00%	0	0.282

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%	0.283	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%	0.283	100%	

Summary of Monitoring Period Round 5

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

3.462 kg/year
 0 kg/year
 3.462 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	0.141
Sampling Point	4	0	0	0.00%	0	0.141
Stem Valve	20	0	0	0.00%	0	1.378
Open End	102	0	0	0.00%	0	1.802
Total:	130	0	0	0.00%	0	3.462

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	130	100.00%	3.462	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:	130	100%	3.462	100%	

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

3.462 kg/year
 0 kg/year
 3.462 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	0.141
Sampling Point	4	0	0	0.00%	0	0.141
Stem Valve	20	0	0	0.00%	0	1.378
Open End	102	0	0	0.00%	0	1.802
Total:	130	0	0	0.00%	0	3.462

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	130	100.00%	3.462	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:	130	100%	3.462	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:

0.283 kg/year
0 kg/year
0.283 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	0.141
Sampling Point	4	0	0	0.00%	0	0.141
Total:	8	0	0	0.00%	0	0.282

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%	0.283	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%	0.283	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:

0.283 kg/year
0 kg/year
0.283 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	0.141
Sampling Point	4	0	0	0.00%	0	0.141
Total:	8	0	0	0.00%	0	0.282

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%	0.283	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%	0.283	100%	



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Cumulative data for period 01-01-2019-31-12-2019

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

[illegible]

Chemical Summary by Component Class

Report Chemical Summary Cumulative Calculation Period: 01/01/2019- 31/12/2019

Equation Set: Refinery
Units of Measurement: KG

Report Date: 26.12.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	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	106-98-9	0.1354
Sampling Point	BENZENE	71432	0.0135
	CYCLOHEXANE	110827	0.0677
	METHYL TERT-BUTYL ETHER	1634044	0.1354
	n-Octane	111-65-9	0.5416
	TOLUENE	108883	0.4604
			1.354
Component Class:	1-Butene	106-98-9	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	106-98-9	0.2248
Open End	BENZENE	71432	0.0225
	CYCLOHEXANE	110827	0.1124
	METHYL TERT-BUTYL ETHER	1634044	0.2248
	n-Octane	111-65-9	0.8993
	TOLUENE	108883	0.7644
			2.2482

Chemical Summary by Component Class

Report Chemical Summary Cumulative Calculation Period: 01/01/2019- 31/12/2019

Equation Set: Refinery
Units of Measurement: KG

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class: Flange	1-Butene	106-98-9	0.0149
	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: Connection	1-Butene	106-98-9	0.2497
	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: All	1-Butene	106-98-9	0.7755
	BENZENE	71432	0.0776
	CYCLOHEXANE	110827	0.3877
	METHYL TERT-BUTYL ETHER	1634044	0.7755
	n-Octane	111-65-9	3.1019
	TOLUENE	108883	2.6367
			7.7549
Grand Total			7.7549

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



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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 Company name										Round 1		Monitoring round		
Alroy Production Unit										First measurement				
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%	6.594	0	0	2	2	0	0	0	4	LL			
6											HL			
	0.0%	6.734	0	0	2	6	0	0	1	8	Subtotal G1			
	0.0%	6.734	0	0	2	6	0	0	1	8	Total Components			
										6.734		Total Annual Emission Rate		

TASHAN Company name										Round 1		Monitoring round		
Alroy Production Unit										Measurement after repair attempt				
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%	6.594	0	0	2	2	0	0	0	4	LL			
6											HL			
	0.0%	6.734	0	0	2	6	0	0	1	8	Subtotal G1			
	0.0%	6.734	0	0	2	6	0	0	1	8	Total Components			
										6.734		Total Annual Emission Rate		

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	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	106-98-9	0.6594
Sampling Point	BENZENE	71432	0.0659
	CYCLOHEXANE	110827	0.3297
	METHYL TERT-BUTYL ETHER	1634044	0.6594
	n-Octane	111-65-9	2.6377
	TOLUENE	108883	2.2421
			6.5942
Component Class:	1-Butene	106-98-9	0.6734
All	BENZENE	71432	0.0673
	CYCLOHEXANE	110827	0.3367
	METHYL TERT-BUTYL ETHER	1634044	0.6734
	n-Octane	111-65-9	2.6938
	TOLUENE	108883	2.2898
			6.7344
Grand Total			6.7344

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	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	106-98-9	0.6594
Sampling Point	BENZENE	71432	0.0659
	CYCLOHEXANE	110827	0.3297
	METHYL TERT-BUTYL ETHER	1634044	0.6594
	n-Octane	111-65-9	2.6377
	TOLUENE	108883	2.2421
			6.5942
Component Class:	1-Butene	106-98-9	0.6734
All	BENZENE	71432	0.0673
	CYCLOHEXANE	110827	0.3367
	METHYL TERT-BUTYL ETHER	1634044	0.6734
	n-Octane	111-65-9	2.6938
	TOLUENE	108883	2.2898
			6.7344
Grand Total			6.7344

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 Company name										Round 2		Monitoring round		
Alroy Production Unit										First measurement				
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%	3.62	0	0	1	3	0	0	0	4	LL			
6											HL			
	0.0%	3.76	0	0	1	7	0	0	1	8	Subtotal G1			
	0.0%	3.76	0	0	1	7	0	0	1	8	Total Components			
										3.76		Total Annual Emission Rate		

TASHAN Company name										Round 2		Monitoring round		
Alroy Production Unit										Measurement after repair attempt				
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%	3.62	0	0	1	3	0	0	0	4	LL			
6											HL			
	0.0%	3.76	0	0	1	7	0	0	1	8	Subtotal G1			
	0.0%	3.76	0	0	1	7	0	0	1	8	Total Components			
										3.76		Total Annual Emission Rate		

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class: PRD	1-Butene	106-98-9	0.014
	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: Sampling Point	1-Butene	106-98-9	0.362
	BENZENE	71432	0.0362
	CYCLOHEXANE	110827	0.181
	METHYL TERT-BUTYL ETHER	1634044	0.362
	n-Octane	111-65-9	1.448
	TOLUENE	108883	1.2308
			3.62
Component Class: All	1-Butene	106-98-9	0.376
	BENZENE	71432	0.0376
	CYCLOHEXANE	110827	0.188
	METHYL TERT-BUTYL ETHER	1634044	0.376
	n-Octane	111-65-9	1.5041
	TOLUENE	108883	1.2785
			3.7602
Grand Total			3.7602

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	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	106-98-9	0.362
Sampling Point	BENZENE	71432	0.0362
	CYCLOHEXANE	110827	0.181
	METHYL TERT-BUTYL ETHER	1634044	0.362
	n-Octane	111-65-9	1.448
	TOLUENE	108883	1.2308
			3.62
Component Class:	1-Butene	106-98-9	0.376
All	BENZENE	71432	0.0376
	CYCLOHEXANE	110827	0.188
	METHYL TERT-BUTYL ETHER	1634044	0.376
	n-Octane	111-65-9	1.5041
	TOLUENE	108883	1.2785
			3.7602
Grand Total			3.7602

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 Alroy							Company name Production Unit		Round 3 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%	1.363	0	0	0	20	0	0	16	20	LL			
2											HL			
2											GV	Open End		
2	0.0%	1.782	0	0	0	102	0	0	0	102	LL			
2											HL			
	0.0%	3.145	0	0	0	122	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%	2.49	0	0	0	38	0	0	0	38	LL			
1											HL			
	0.0%	2.639	0	0	0	93	0	0	0	93	Subtotal G3			
	0.0%	6.064	0	0	0	223	0	0	17	223	Total Components			
										6.064 Total Annual Emission Rate				
TASHAN Alroy							Company name Production Unit		Round 3 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%	1.363	0	0	0	20	0	0	16	20	LL			
2											HL			
2											GV	Open End		
2	0.0%	1.782	0	0	0	102	0	0	0	102	LL			
2											HL			
	0.0%	3.145	0	0	0	122	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%	2.49	0	0	0	38	0	0	0	38	LL			
1											HL			
	0.0%	2.639	0	0	0	93	0	0	0	93	Subtotal G3			
	0.0%	6.064	0	0	0	223	0	0	17	223	Total Components			
										6.064 Total Annual Emission Rate				

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0559
	TOLUENE	108883	0.0475
			0.1398
Component Class:	1-Butene	106-98-9	0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0559
	TOLUENE	108883	0.0475
			0.1398
Component Class:	1-Butene	106-98-9	0.1363
Stem Valve	BENZENE	71432	0.0136
	CYCLOHEXANE	110827	0.0681
	METHYL TERT-BUTYL ETHER	1634044	0.1363
	n-Octane	111-65-9	0.5451
	TOLUENE	108883	0.4634
			1.3628
Component Class:	1-Butene	106-98-9	0.1782
Open End	BENZENE	71432	0.0178
	CYCLOHEXANE	110827	0.0891
	METHYL TERT-BUTYL ETHER	1634044	0.1782
	n-Octane	111-65-9	0.7129
	TOLUENE	108883	0.6059
			1.7821

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCMI

Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit

	<u>Chemical Name (Stream Name if Not Speciated)</u>	<u>CAS Number</u>	<u>Emissions</u>
<u>Component Class:</u> Flange	1-Butene	106-98-9	0.0149
	BENZENE	71432	0.0015
	CYCLOHEXANE	110827	0.0074
	METHYL TERT-BUTYL ETHER	1634044	0.0149
	n-Octane	111-65-9	0.0596
	TOLUENE	108883	0.0506
			<u>0.1489</u>
<u>Component Class:</u> Connection	1-Butene	106-98-9	0.249
	BENZENE	71432	0.0249
	CYCLOHEXANE	110827	0.1245
	METHYL TERT-BUTYL ETHER	1634044	0.249
	n-Octane	111-65-9	0.9959
	TOLUENE	108883	0.8465
			<u>2.4898</u>
<u>Component Class:</u> All	1-Butene	106-98-9	0.6064
	BENZENE	71432	0.0606
	CYCLOHEXANE	110827	0.3031
	METHYL TERT-BUTYL ETHER	1634044	0.6064
	n-Octane	111-65-9	2.4253
	TOLUENE	108883	2.0614
			<u>6.0632</u>
<u>Grand Total</u>			<u>6.0632</u>

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	0.014
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0559
	TOLUENE	108883	0.0475
			0.1398
Component Class:	1-Butene	106-98-9	0.014
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.007
	METHYL TERT-BUTYL ETHER	1634044	0.014
	n-Octane	111-65-9	0.0559
	TOLUENE	108883	0.0475
			0.1398
Component Class:	1-Butene	106-98-9	0.1363
Stem Valve	BENZENE	71432	0.0136
	CYCLOHEXANE	110827	0.0681
	METHYL TERT-BUTYL ETHER	1634044	0.1363
	n-Octane	111-65-9	0.5451
	TOLUENE	108883	0.4634
			1.3628
Component Class:	1-Butene	106-98-9	0.1782
Open End	BENZENE	71432	0.0178
	CYCLOHEXANE	110827	0.0891
	METHYL TERT-BUTYL ETHER	1634044	0.1782
	n-Octane	111-65-9	0.7129
	TOLUENE	108883	0.6059
			1.7821

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCMI

Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class: Flange	1-Butene	106-98-9	0.0149
	BENZENE	71432	0.0015
	CYCLOHEXANE	110827	0.0074
	METHYL TERT-BUTYL ETHER	1634044	0.0149
	n-Octane	111-65-9	0.0596
	TOLUENE	108883	0.0506
			0.1489
Component Class: Connection	1-Butene	106-98-9	0.249
	BENZENE	71432	0.0249
	CYCLOHEXANE	110827	0.1245
	METHYL TERT-BUTYL ETHER	1634044	0.249
	n-Octane	111-65-9	0.9959
	TOLUENE	108883	0.8465
			2.4898
Component Class: All	1-Butene	106-98-9	0.6064
	BENZENE	71432	0.0606
	CYCLOHEXANE	110827	0.3031
	METHYL TERT-BUTYL ETHER	1634044	0.6064
	n-Octane	111-65-9	2.4253
	TOLUENE	108883	2.0614
			6.0632
Grand Total			6.0632

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										Round 4		Monitoring round	
Alroy Production Unit										First measurement			
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%	0.141	0	0	0	4	0	0	1	4	LL		
6										HL			
6											GV	Sampling Point	
6	0.0%	0.141	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.282	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.282	0	0	0	8	0	0			8 Total Components		
										0.282 Total Annual Emission Rate			

TASHAN Company name										Round 4		Monitoring round	
Alroy Production Unit										Measurement after repair attempt			
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%	0.141	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.141	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.282	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.282	0	0	0	8	0	0			8 Total Components		
										0.282 Total Annual Emission Rate			

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	0.0141
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0141
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0282
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.0142
	METHYL TERT-BUTYL ETHER	1634044	0.0282
	n-Octane	111-65-9	0.113
	TOLUENE	108883	0.096
			0.2824
Grand Total			0.2824

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	0.0141
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0141
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0282
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.0142
	METHYL TERT-BUTYL ETHER	1634044	0.0282
	n-Octane	111-65-9	0.113
	TOLUENE	108883	0.096
			0.2824
Grand Total			0.2824

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 Company name Alroy 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%	0.141	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.141	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.282	0	0	0	8	0	0	1	8	Subtotal G1		
2											GV	Stem Valve	G2
2	0.0%	1.378	0	0	0	20	0	0	16	20	LL		
2											HL		
2											GV	Open End	
2	0.0%	1.802	0	0	0	102	0	0	0	102	LL		
2											HL		
	0.0%	3.18	0	0	0	122	0	0	16	122	Subtotal G2		
	0.0%	3.462	0	0	0	130	0	0	17	130	Total Components		
										3.462 Total Annual Emission Rate			

TASHAN Company name Alroy 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%	0.141	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.141	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.282	0	0	0	8	0	0	1	8	Subtotal G1		
2											GV	Stem Valve	G2
2	0.0%	1.378	0	0	0	20	0	0	16	20	LL		
2											HL		
2											GV	Open End	
2	0.0%	1.802	0	0	0	102	0	0	0	102	LL		
2											HL		
	0.0%	3.18	0	0	0	122	0	0	16	122	Subtotal G2		
	0.0%	3.462	0	0	0	130	0	0	17	130	Total Components		
										3.462 Total Annual Emission Rate			

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	0.0141
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0141
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.1378
Stem Valve	BENZENE	71432	0.0138
	CYCLOHEXANE	110827	0.0689
	METHYL TERT-BUTYL ETHER	1634044	0.1378
	n-Octane	111-65-9	0.5511
	TOLUENE	108883	0.4684
			1.3778
Component Class:	1-Butene	106-98-9	0.1802
Open End	BENZENE	71432	0.018
	CYCLOHEXANE	110827	0.0901
	METHYL TERT-BUTYL ETHER	1634044	0.1802
	n-Octane	111-65-9	0.7207
	TOLUENE	108883	0.6126
			1.8018

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCMI

Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit

<u>Component Class:</u>	<u>Chemical Name (Stream Name if Not Speciated)</u>	<u>CAS Number</u>	<u>Emissions</u>
All	1-Butene	106-98-9	0.3462
	BENZENE	71432	0.0346
	CYCLOHEXANE	110827	0.1732
	METHYL TERT-BUTYL ETHER	1634044	0.3462
	n-Octane	111-65-9	1.3848
	TOLUENE	108883	1.177
			<u>3.462</u>

Grand Total **3.462**

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	0.0141
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0141
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.1378
Stem Valve	BENZENE	71432	0.0138
	CYCLOHEXANE	110827	0.0689
	METHYL TERT-BUTYL ETHER	1634044	0.1378
	n-Octane	111-65-9	0.5511
	TOLUENE	108883	0.4684
			1.3778
Component Class:	1-Butene	106-98-9	0.1802
Open End	BENZENE	71432	0.018
	CYCLOHEXANE	110827	0.0901
	METHYL TERT-BUTYL ETHER	1634044	0.1802
	n-Octane	111-65-9	0.7207
	TOLUENE	108883	0.6126
			1.8018

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCMI

Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit

<u>Component Class:</u>	<u>Chemical Name (Stream Name if Not Speciated)</u>	<u>CAS Number</u>	<u>Emissions</u>
All	1-Butene	106-98-9	0.3462
	BENZENE	71432	0.0346
	CYCLOHEXANE	110827	0.1732
	METHYL TERT-BUTYL ETHER	1634044	0.3462
	n-Octane	111-65-9	1.3848
	TOLUENE	108883	1.177
			<u>3.462</u>

Grand Total **3.462**

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



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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%	0.141	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.141	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.282	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.282	0	0	0	8	0	0	1	8	8 Total Components		
										0.282 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%	0.141	0	0	0	4	0	0	1	4	LL		
6											HL		
6											GV	Sampling Point	
6	0.0%	0.141	0	0	0	4	0	0	0	4	LL		
6											HL		
	0.0%	0.282	0	0	0	8	0	0	1	8	Subtotal G1		
	0.0%	0.282	0	0	0	8	0	0	1	8	8 Total Components		
										0.282 Total Annual Emission Rate			

Chemical Summary by Component Class

Report Chemical Summary First Measurement

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy

Unit

	<u>Chemical Name (Stream Name if Not Speciated)</u>	<u>CAS Number</u>	<u>Emissions</u>
<u>Component Class:</u>	1-Butene	106-98-9	0.0141
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			<u>0.1412</u>
<u>Component Class:</u>	1-Butene	106-98-9	0.0141
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			<u>0.1412</u>
<u>Component Class:</u>	1-Butene	106-98-9	0.0282
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.0142
	METHYL TERT-BUTYL ETHER	1634044	0.0282
	n-Octane	111-65-9	0.113
	TOLUENE	108883	0.096
			<u>0.2824</u>
<u>Grand Total</u>			<u>0.2824</u>

Chemical Summary by Component Class

Report Chemical Summary After Repair

Equation Set: SOCM1
Units of Measurement: KG/year

Report Date: 26.12.2019

Alroy			
Unit	Chemical Name (Stream Name if Not Speciated)	CAS Number	Emissions
Component Class:	1-Butene	106-98-9	0.0141
PRD	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0141
Sampling Point	BENZENE	71432	0.0014
	CYCLOHEXANE	110827	0.0071
	METHYL TERT-BUTYL ETHER	1634044	0.0141
	n-Octane	111-65-9	0.0565
	TOLUENE	108883	0.048
			0.1412
Component Class:	1-Butene	106-98-9	0.0282
All	BENZENE	71432	0.0028
	CYCLOHEXANE	110827	0.0142
	METHYL TERT-BUTYL ETHER	1634044	0.0282
	n-Octane	111-65-9	0.113
	TOLUENE	108883	0.096
			0.2824
Grand Total			0.2824

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



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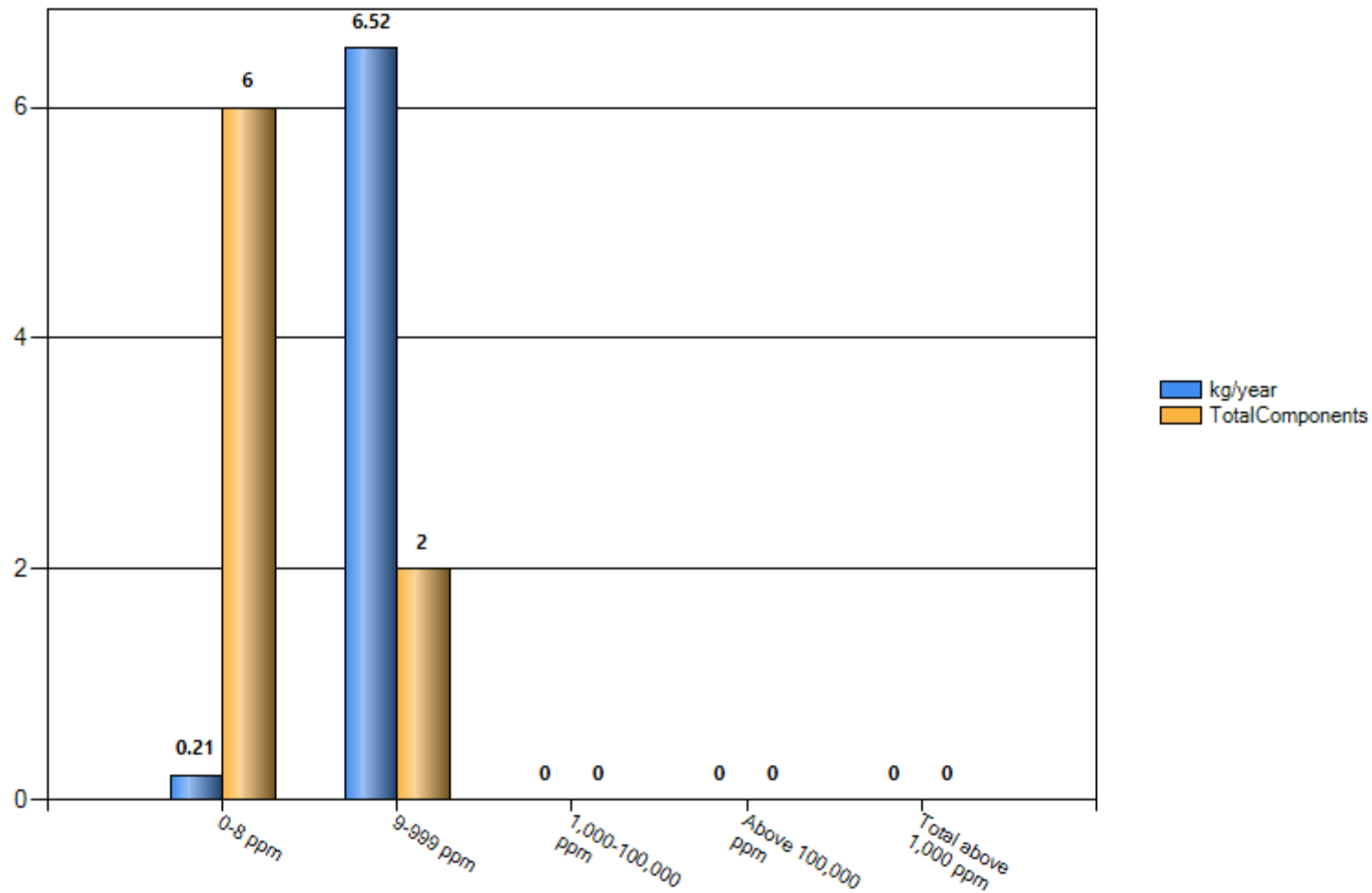
Graphs Round 1 First measurement.

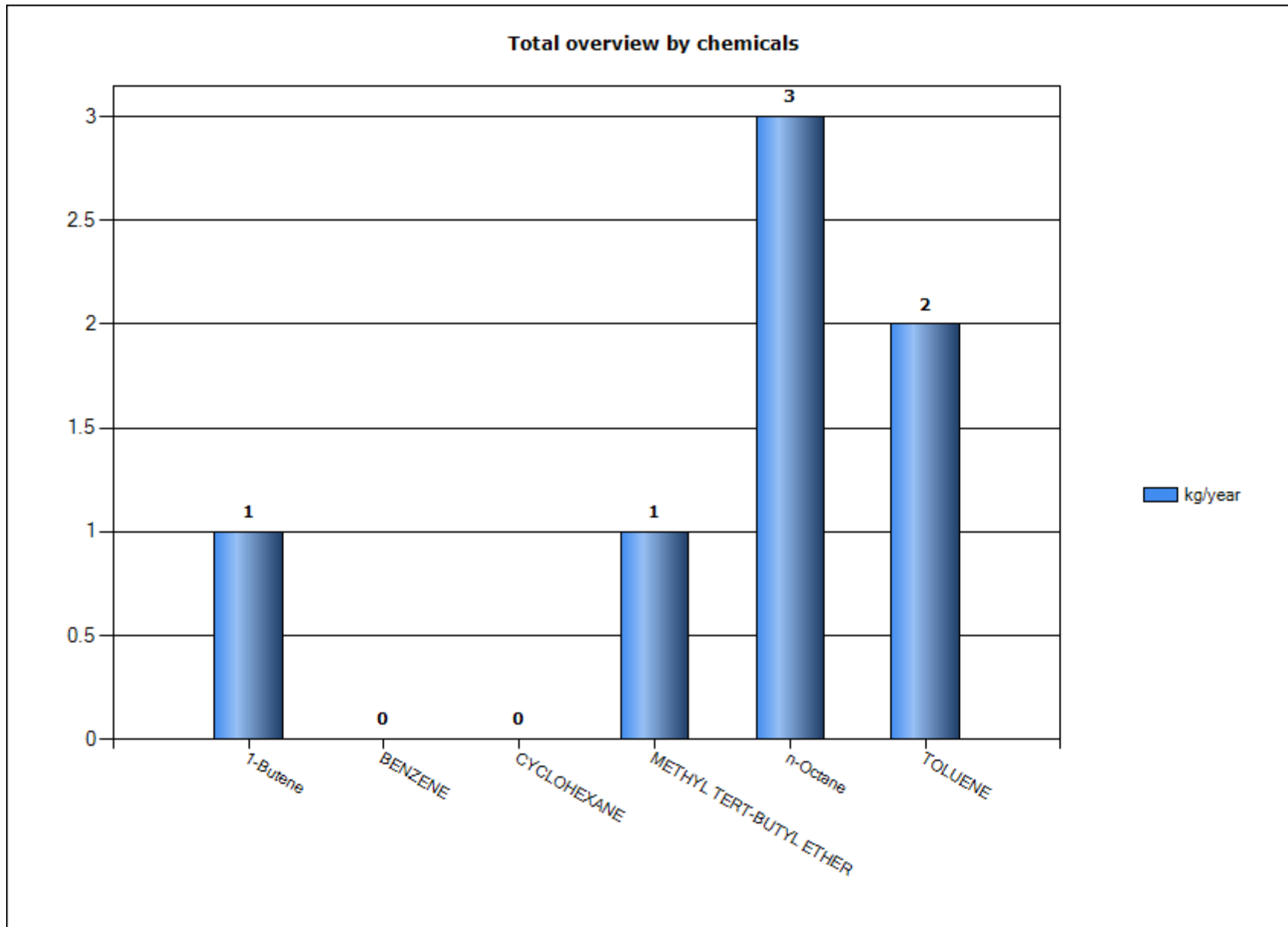
Comparison between count of sources & kg/year, by reading range

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

Total overview by chemicals

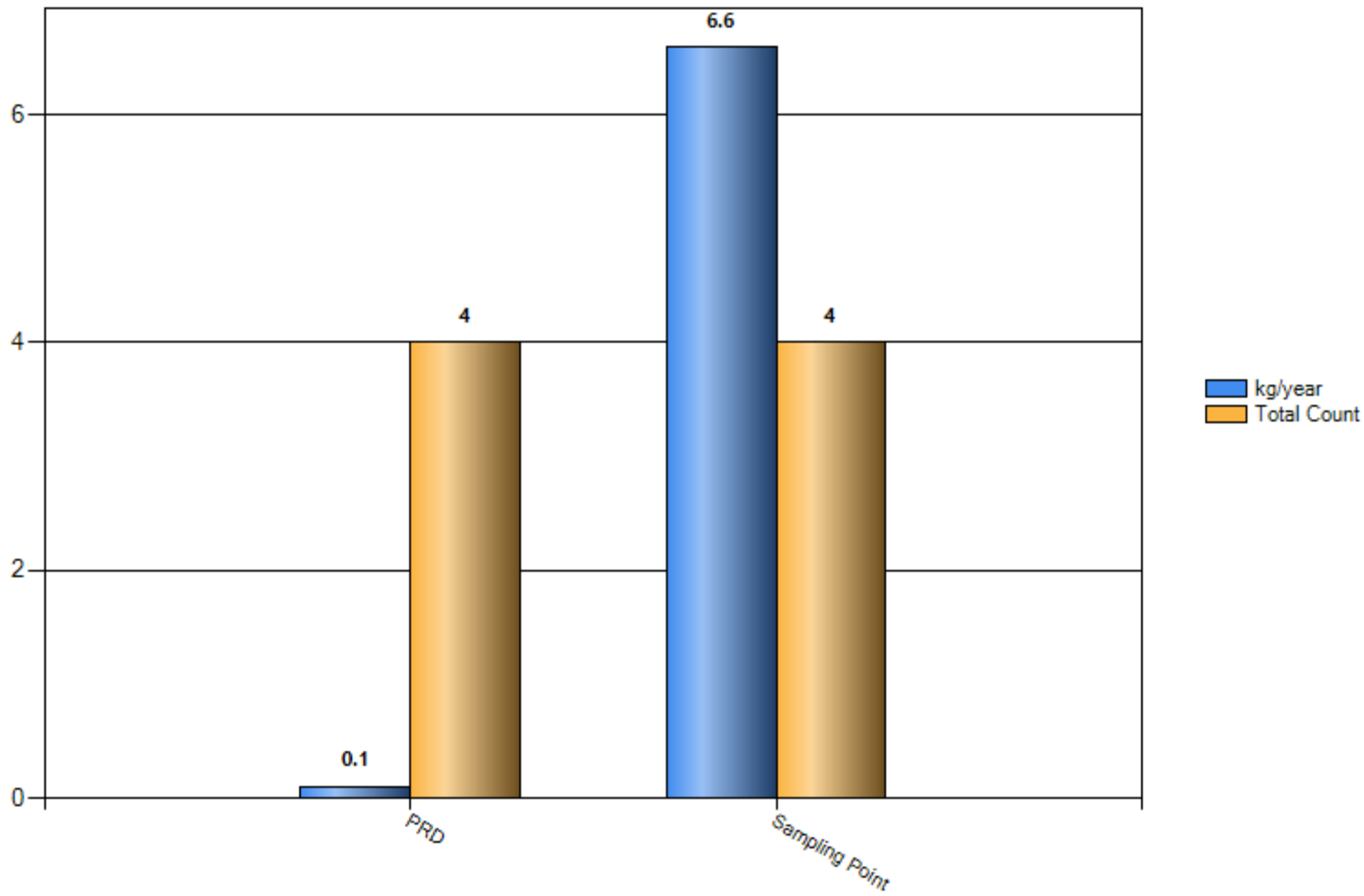
Overview by reading range





Graph6.1.3 R1

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



Graph6.1.2 R1



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Mobile: +972-52-7361309, E-mail: michael@labs-eco.com

Graphs Round 1

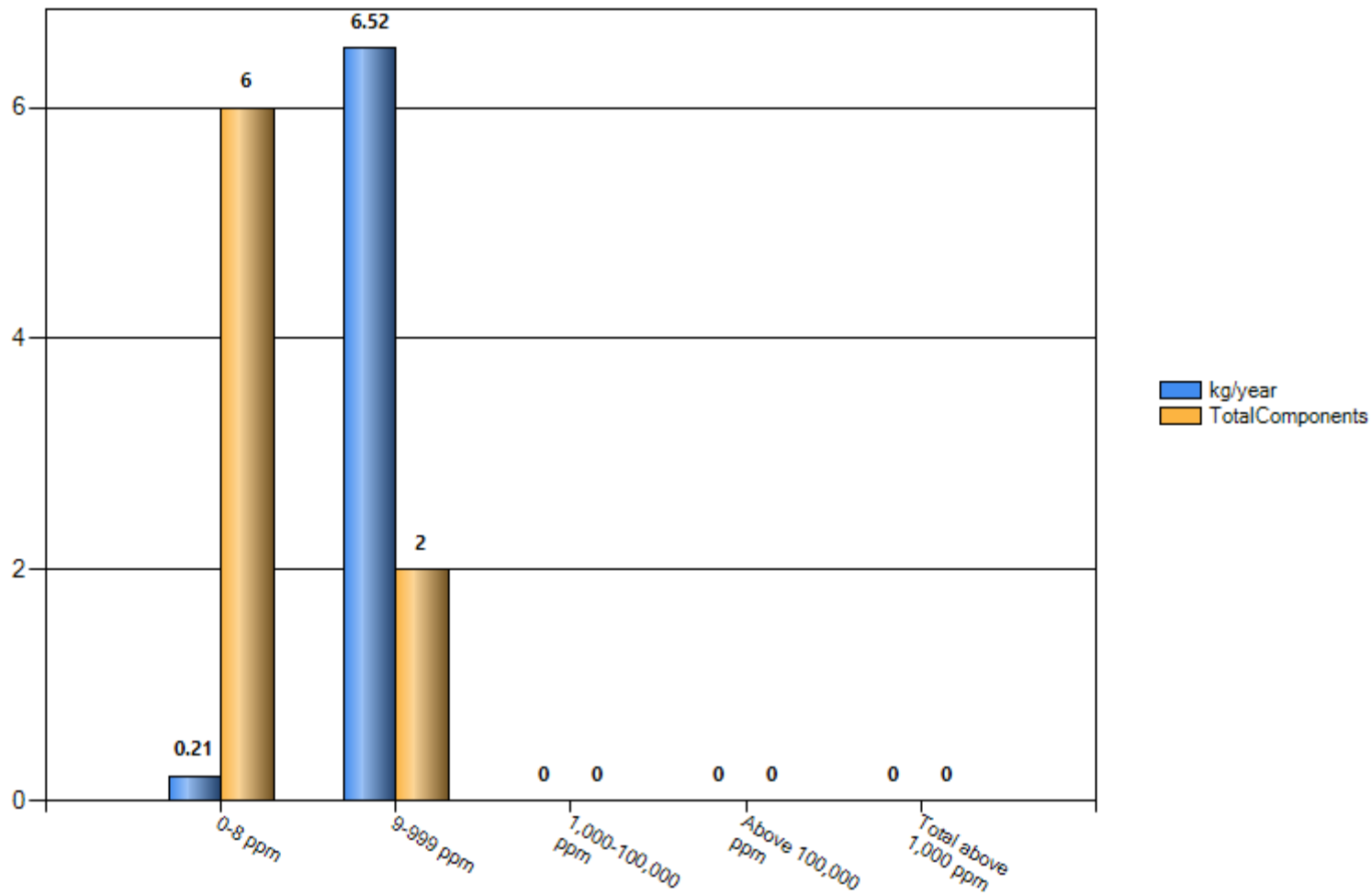
Measurement after repair attempt.

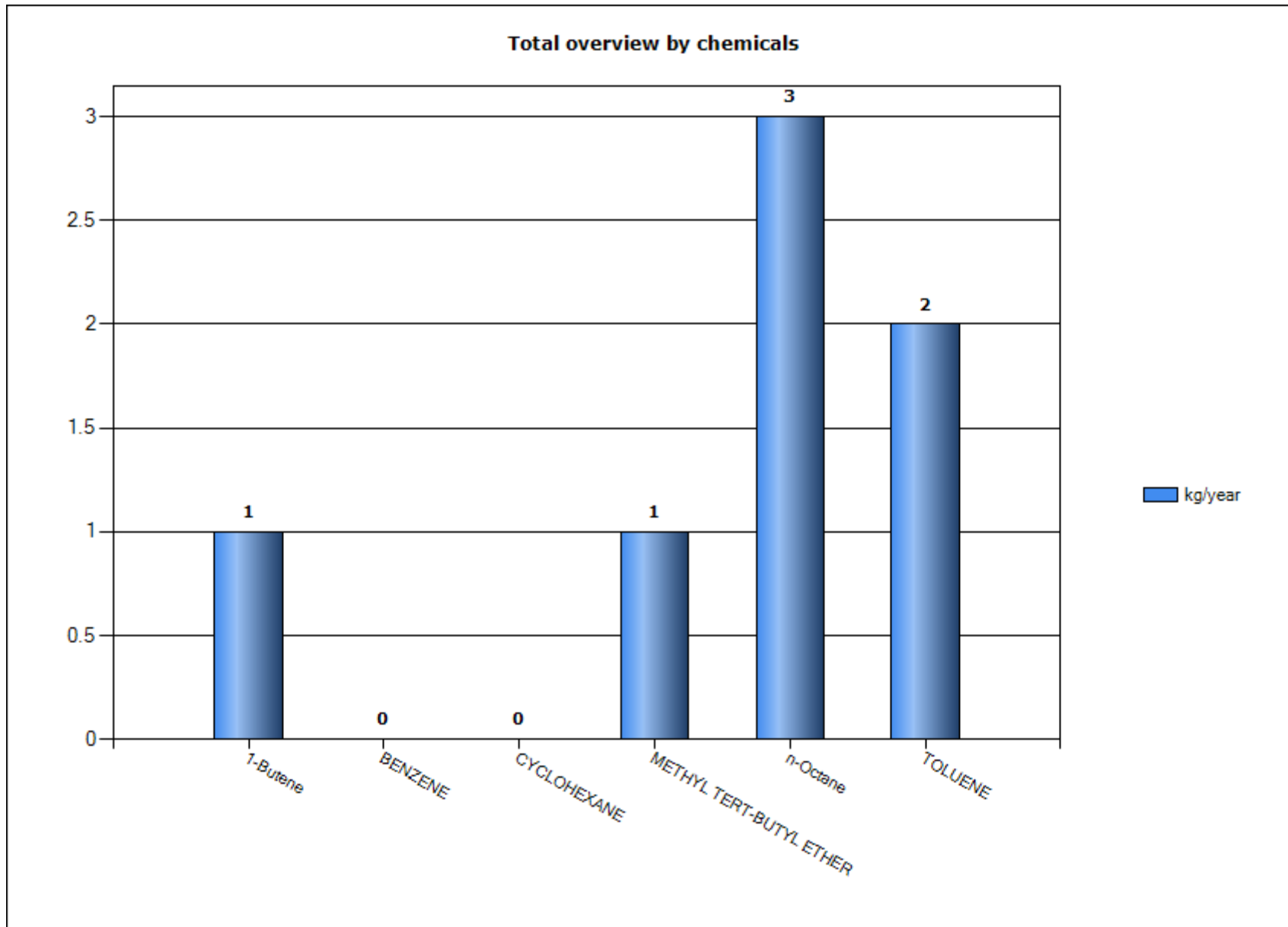
Comparison between count of sources & kg/year, by reading range

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

Total overview by chemicals

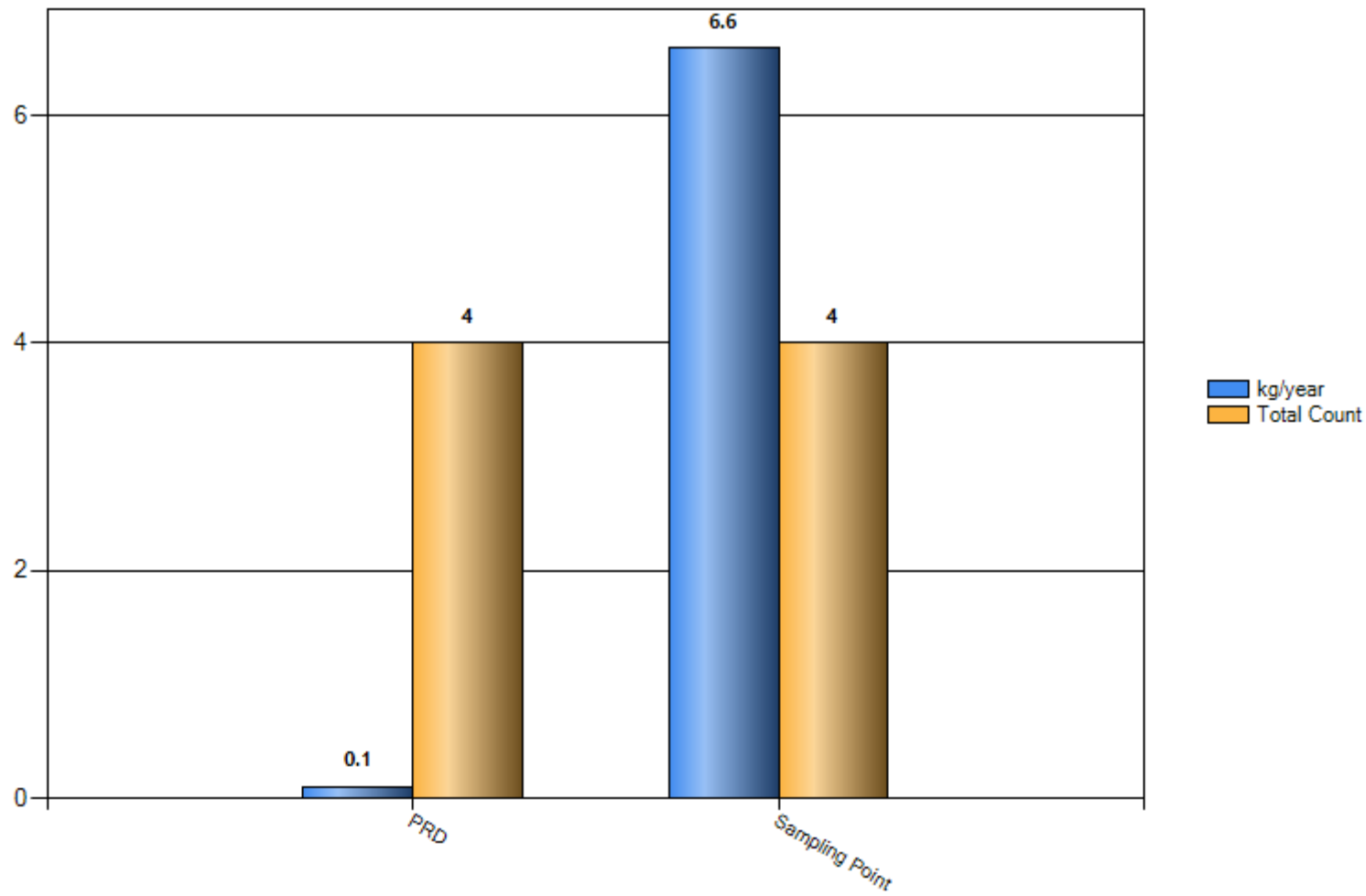
Overview by reading range





Graph6.2.3 R1

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





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Mobile: +972-52-7361309, E-mail: michael@labs-eco.com

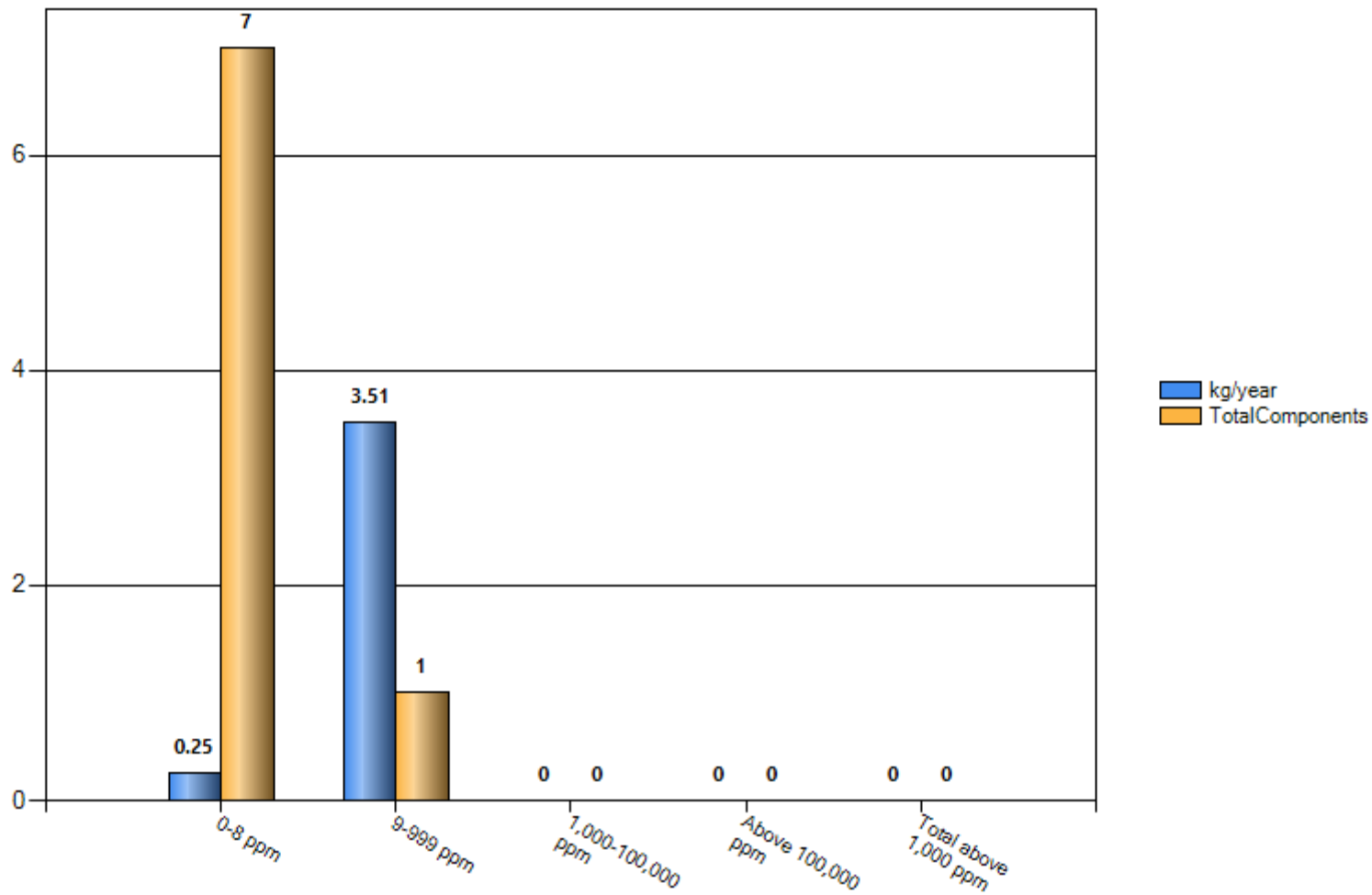
Graphs Round 2 First measurement.

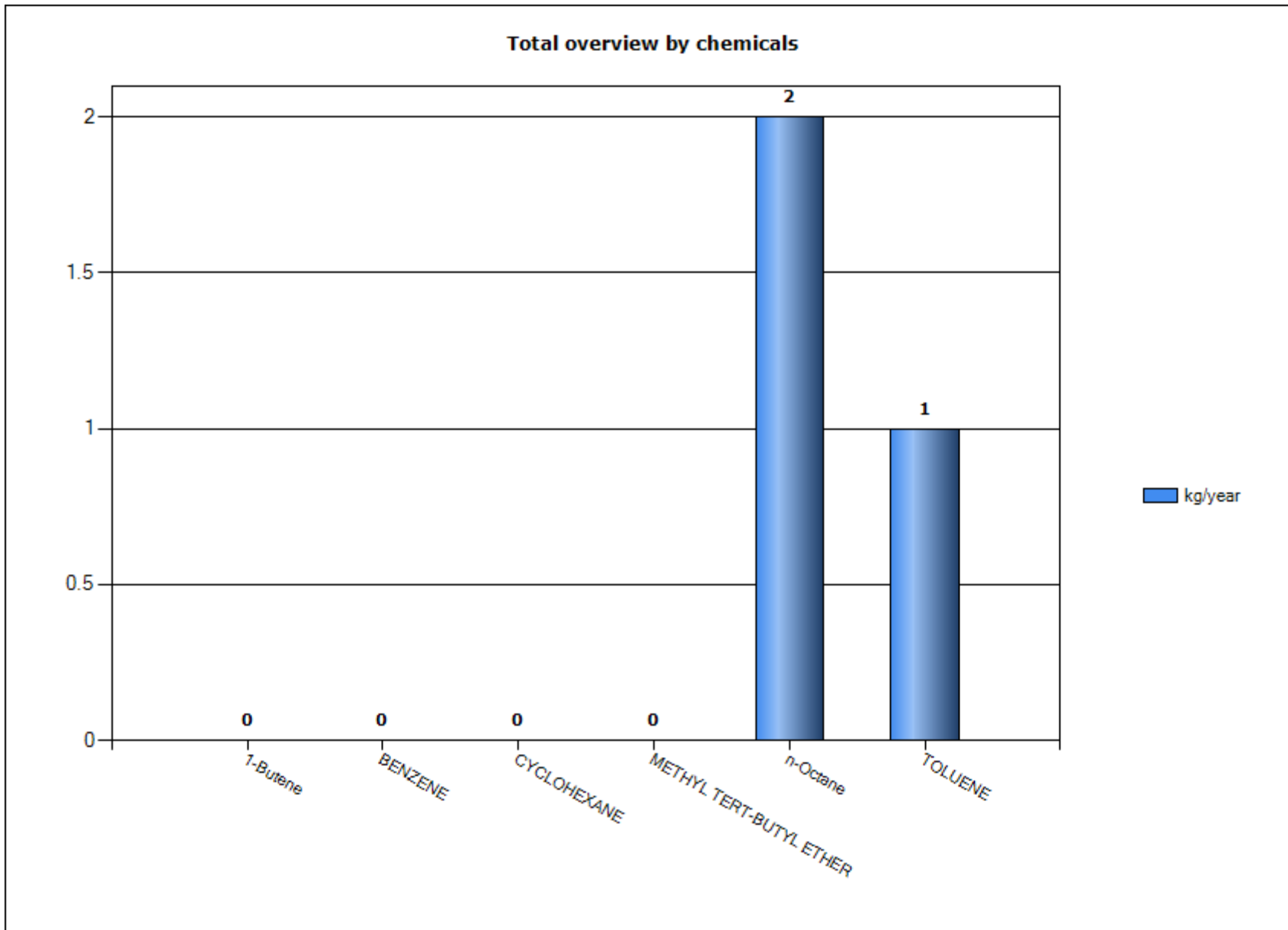
Comparison between count of sources & kg/year, by reading range

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

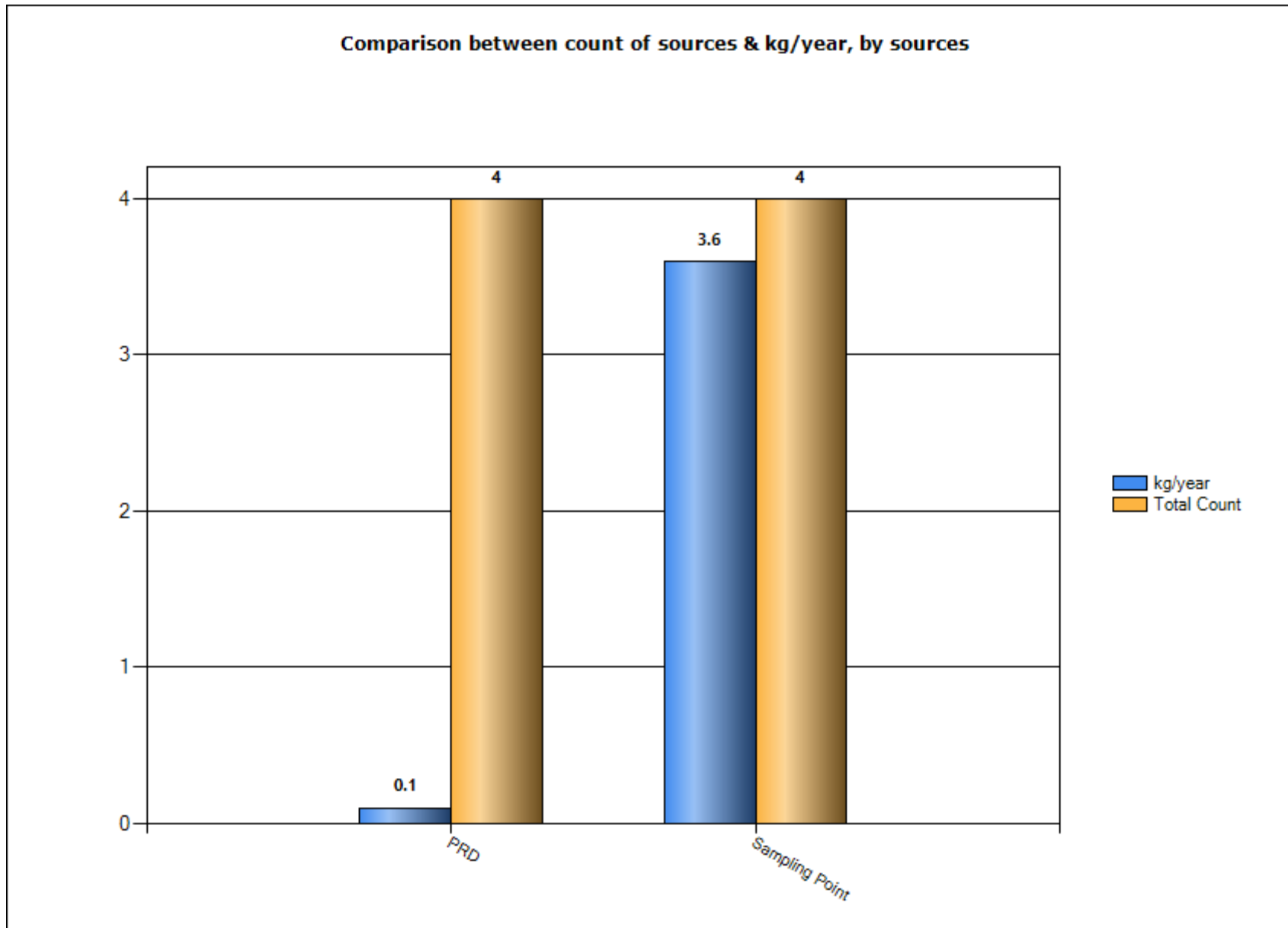
Total overview by chemicals

Overview by reading range





Graph6.1.3 R2



Graph6.1.2 R2



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Graphs Round 2

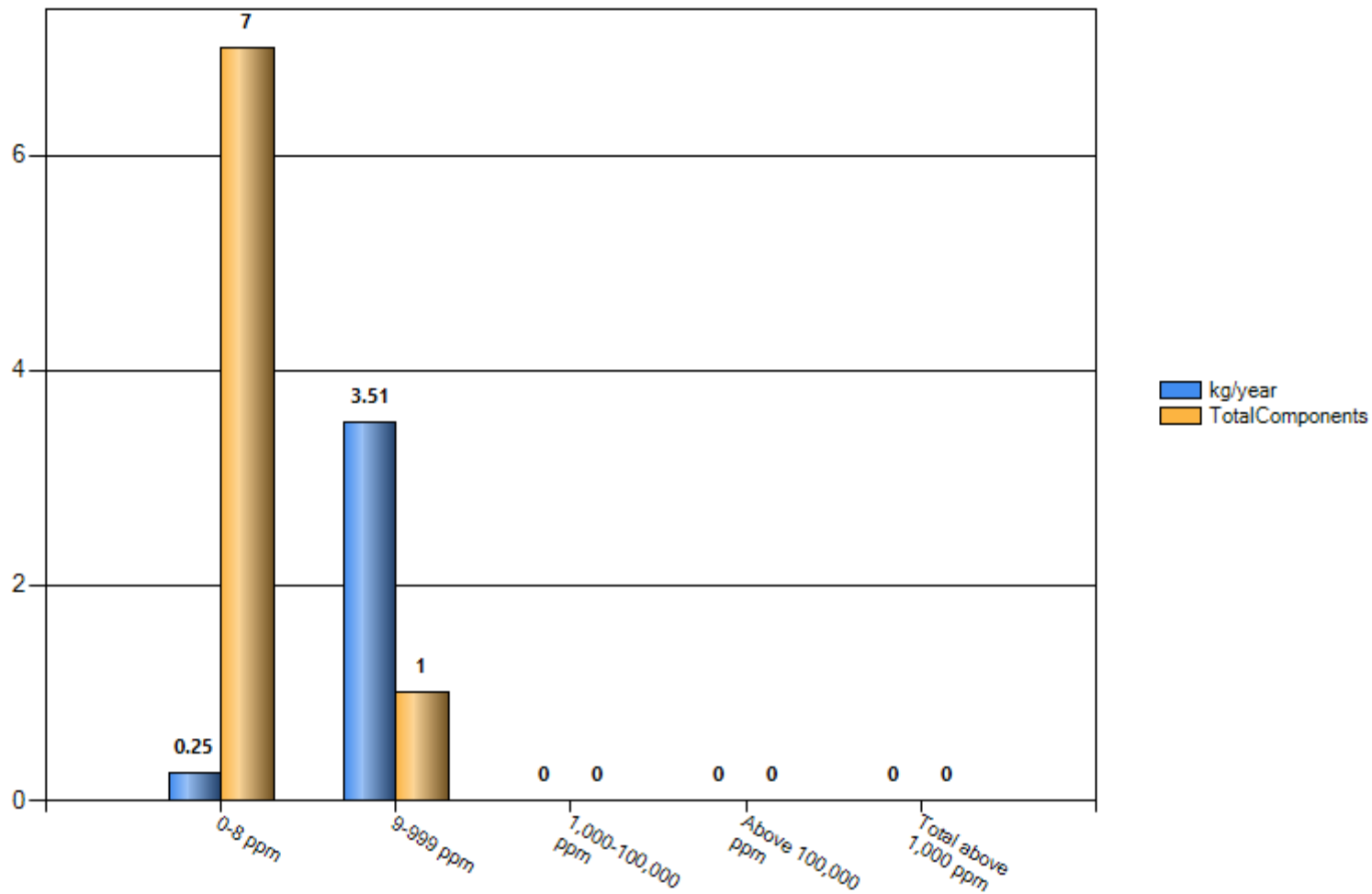
Measurement after repair attempt.

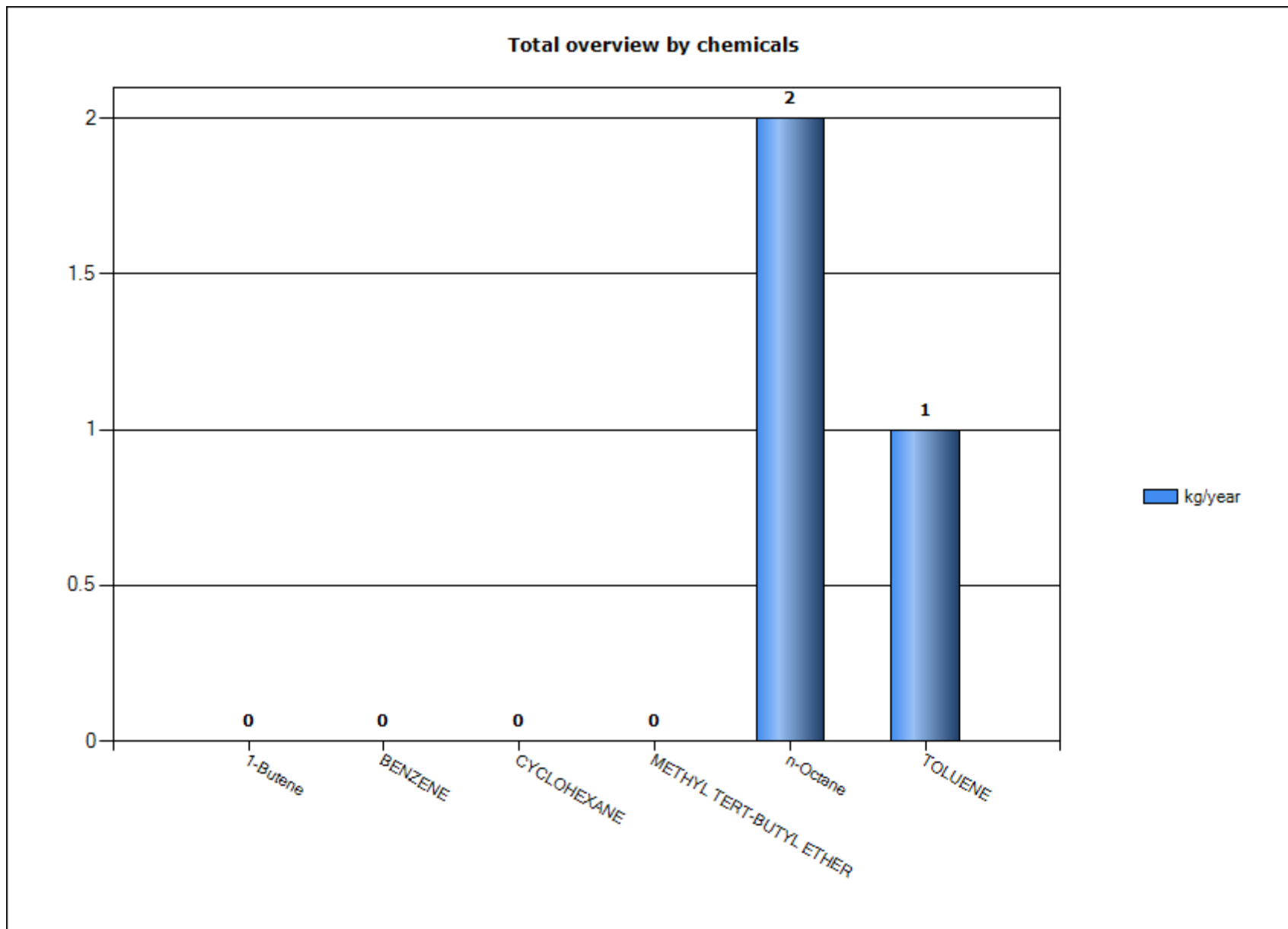
Comparison between count of sources & kg/year, by reading range

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

Total overview by chemicals

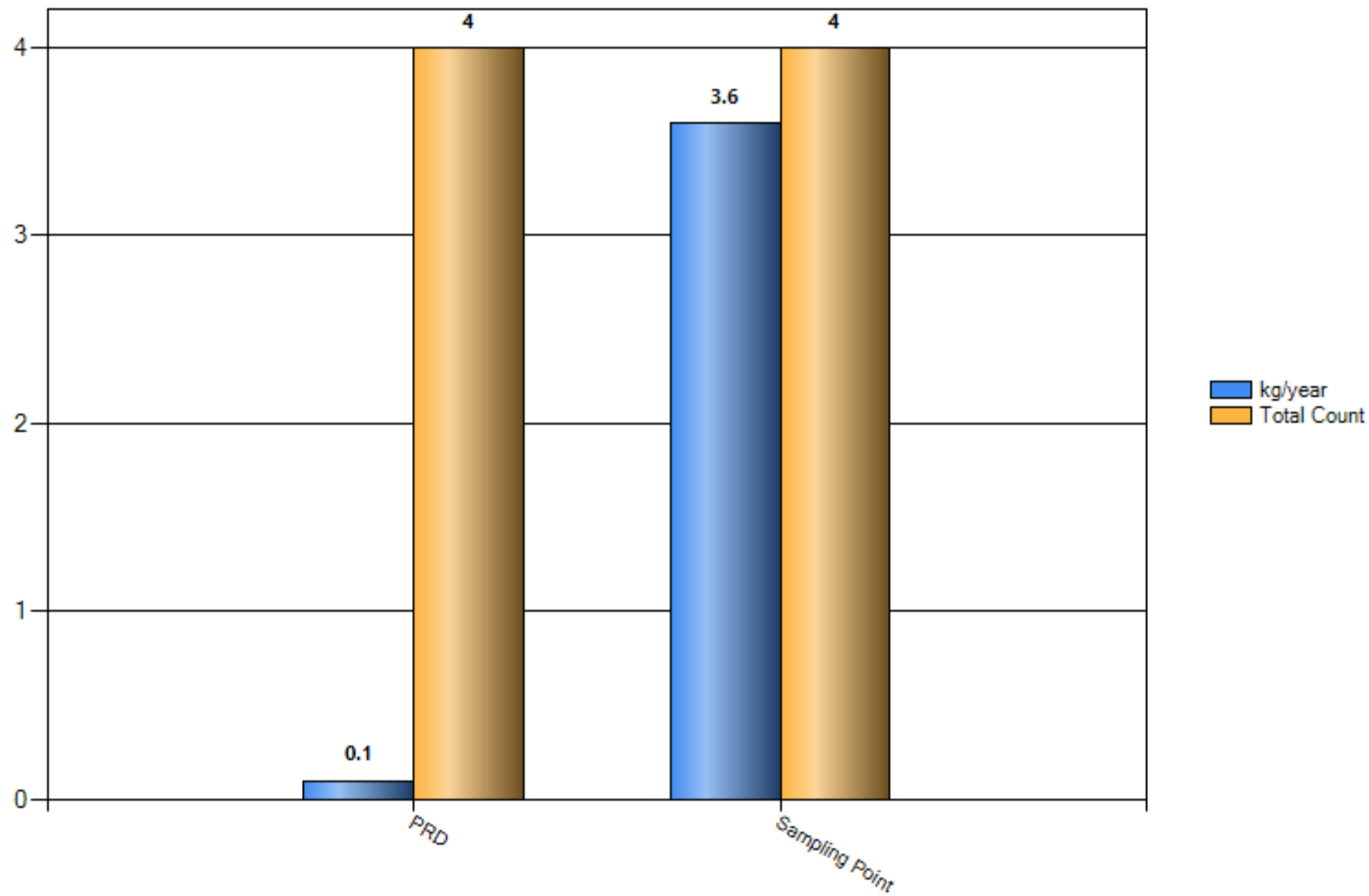
Overview by reading range





Graph6.2.3 R2

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





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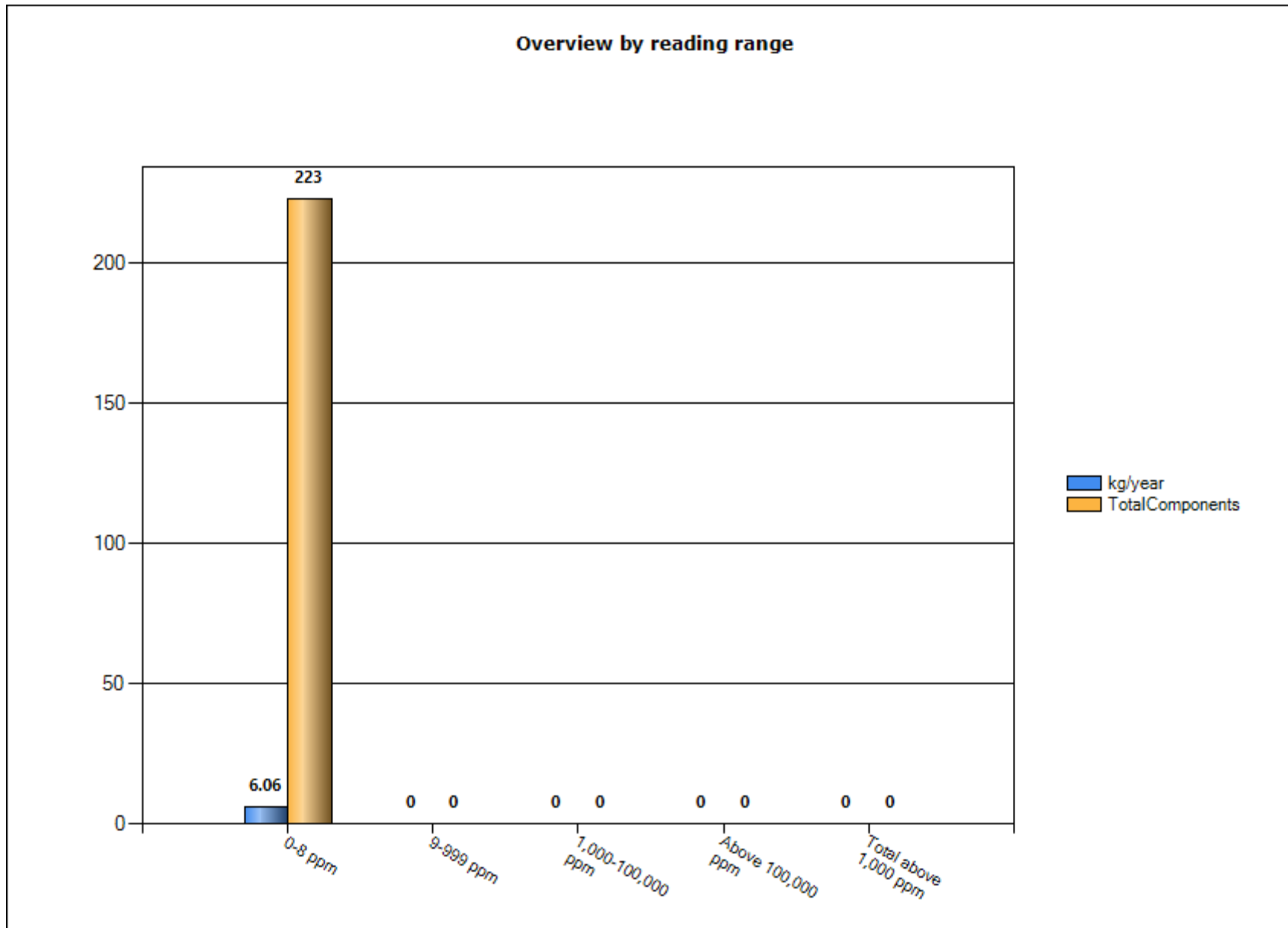
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Graphs Round 3 First measurement.

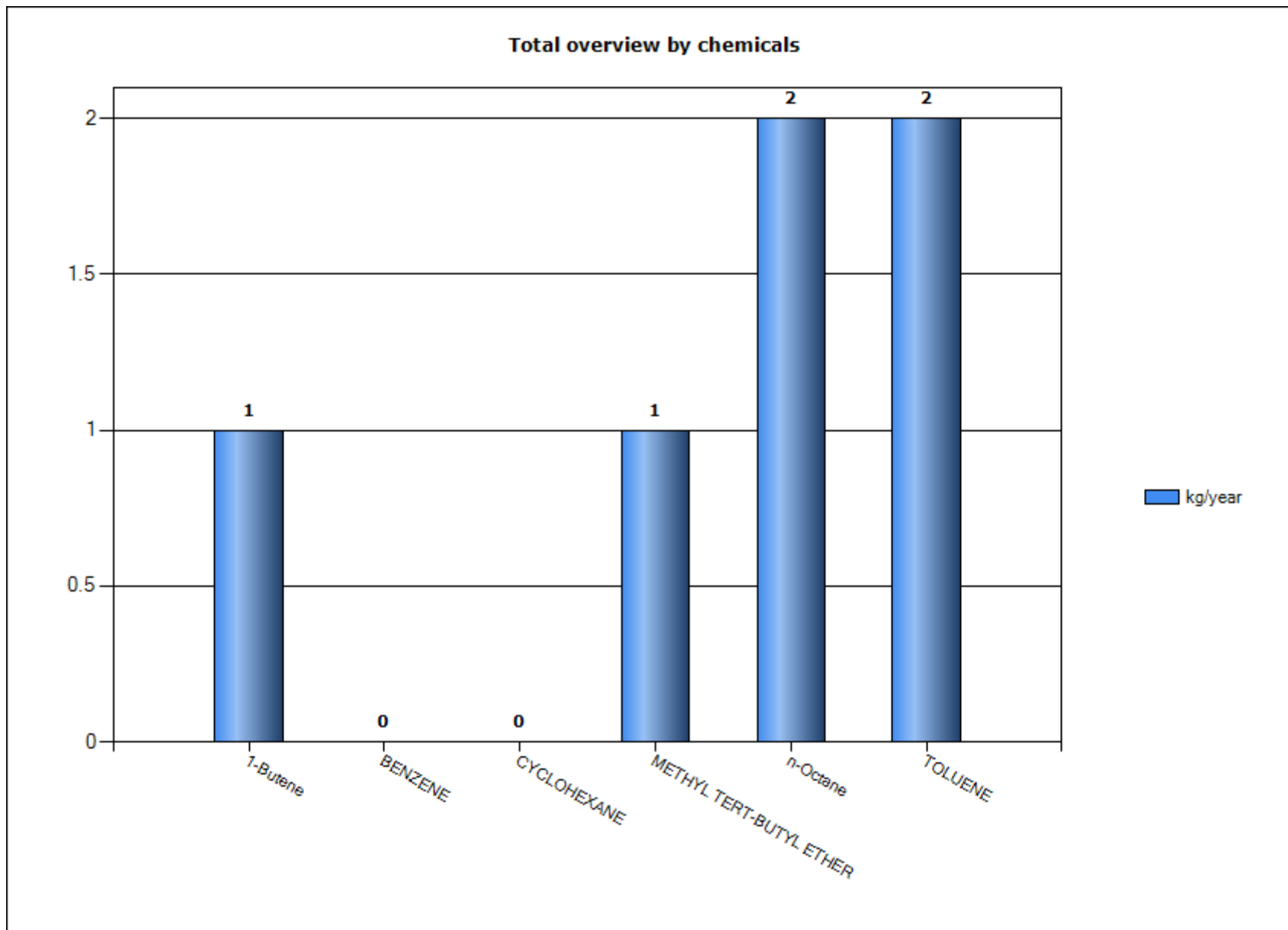
Comparison between count of sources & kg/year, by reading range

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

Total overview by chemicals

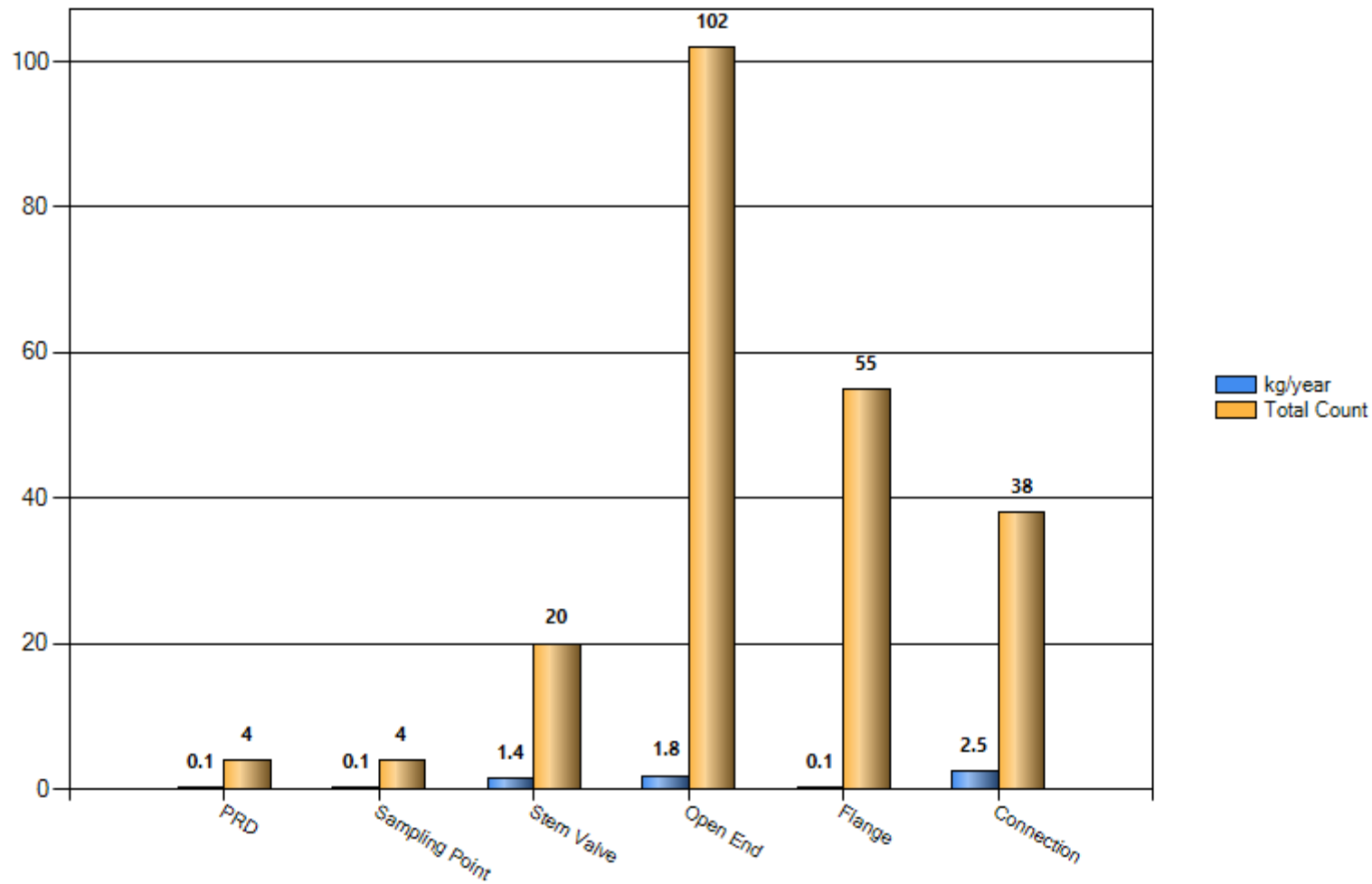


Graph6.1.1 R3



Graph6.1.3 R3

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





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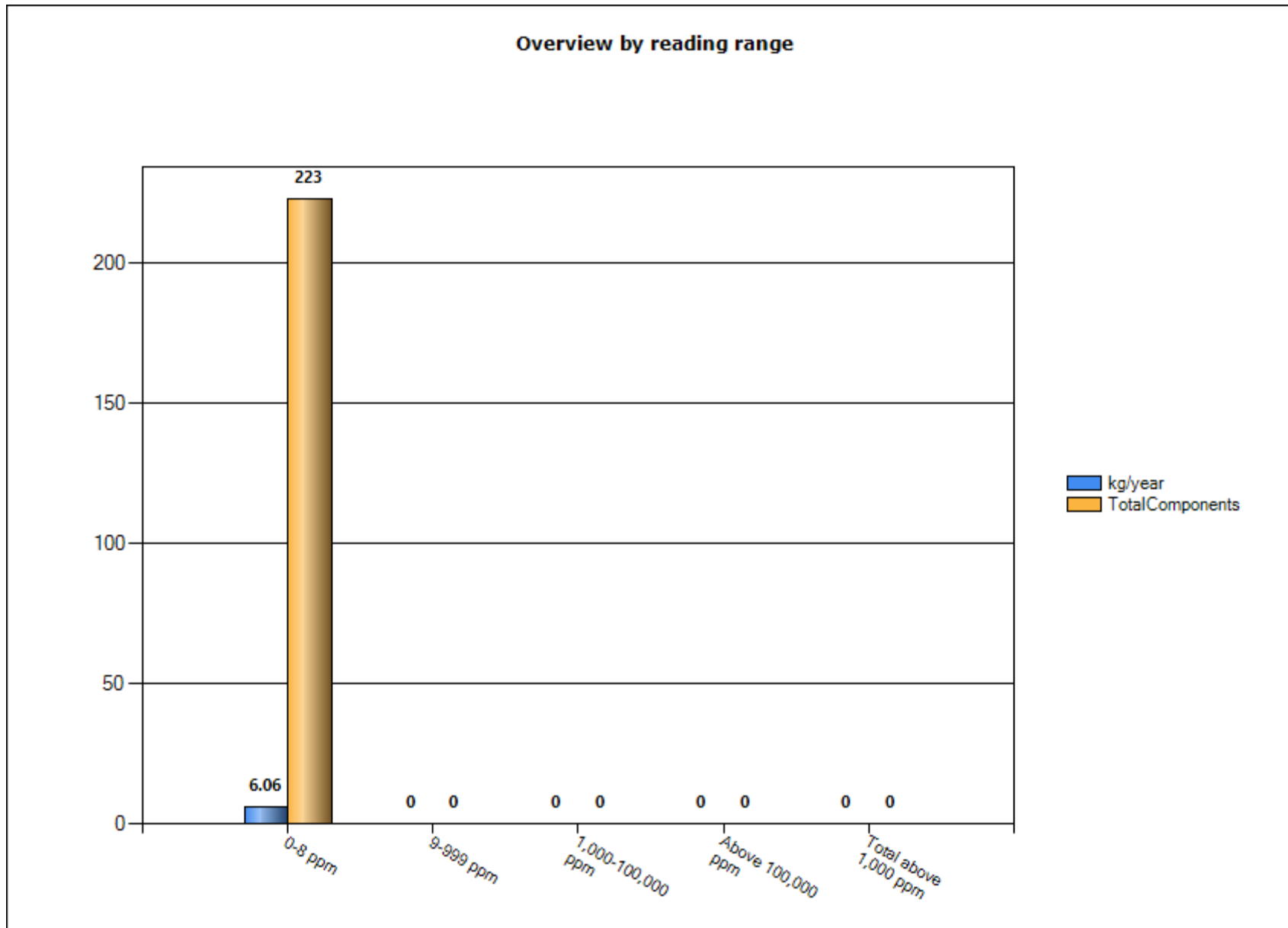
Graphs Round 3

Measurement after repair attempt.

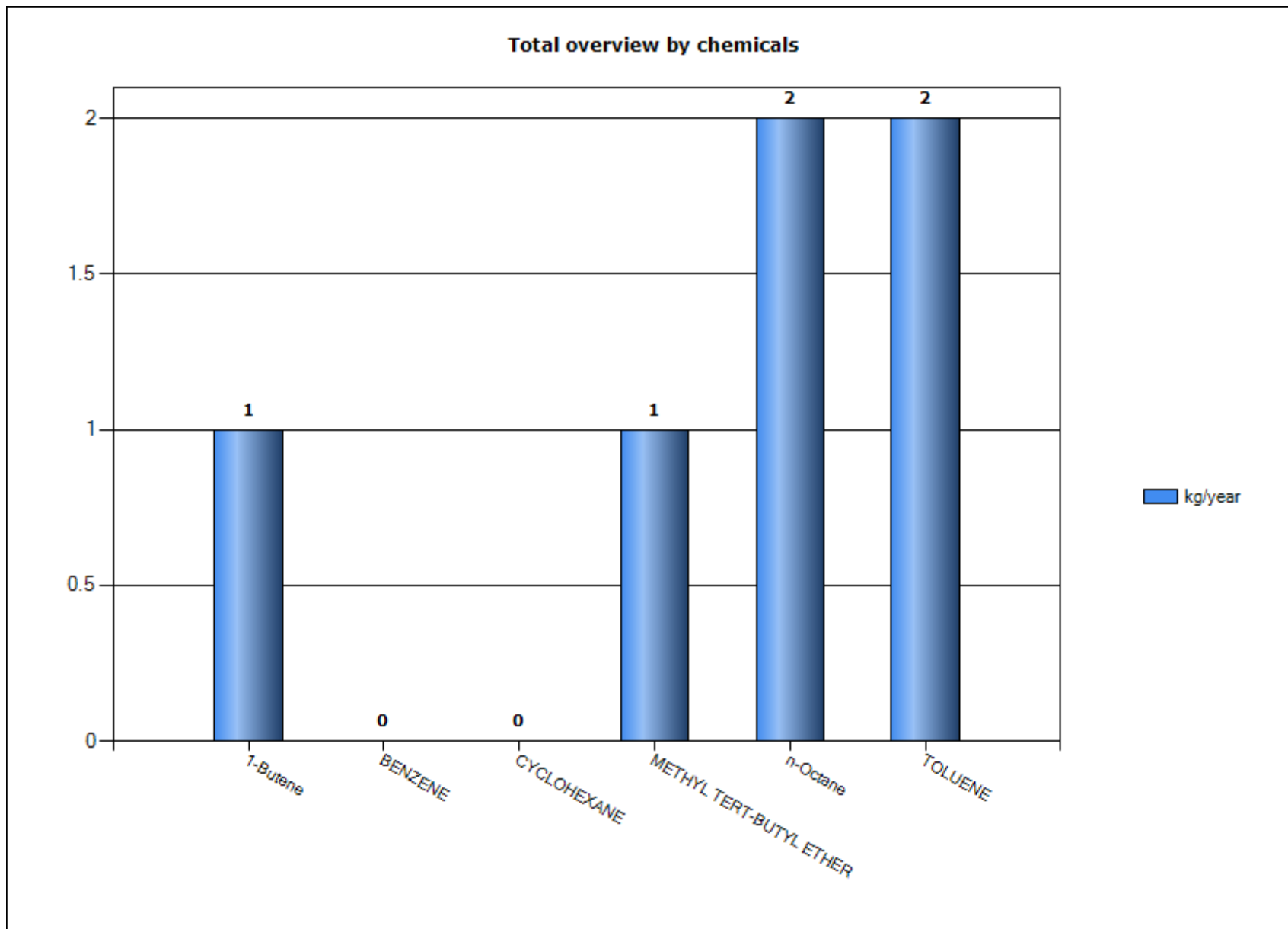
Comparison between count of sources & kg/year, by reading range

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

Total overview by chemicals

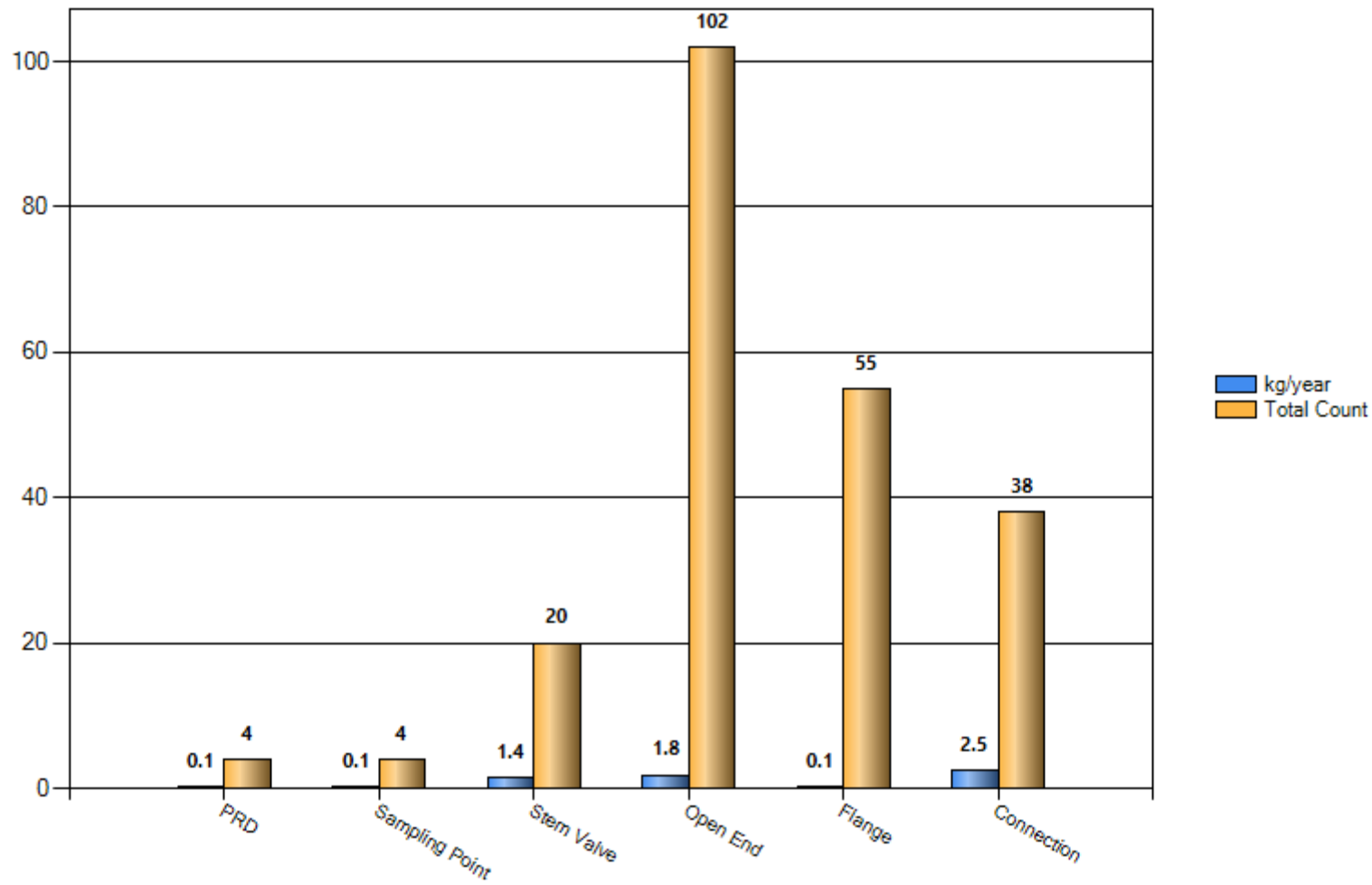


Graph6.2.1 R3



Graph6.2.3 R3

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





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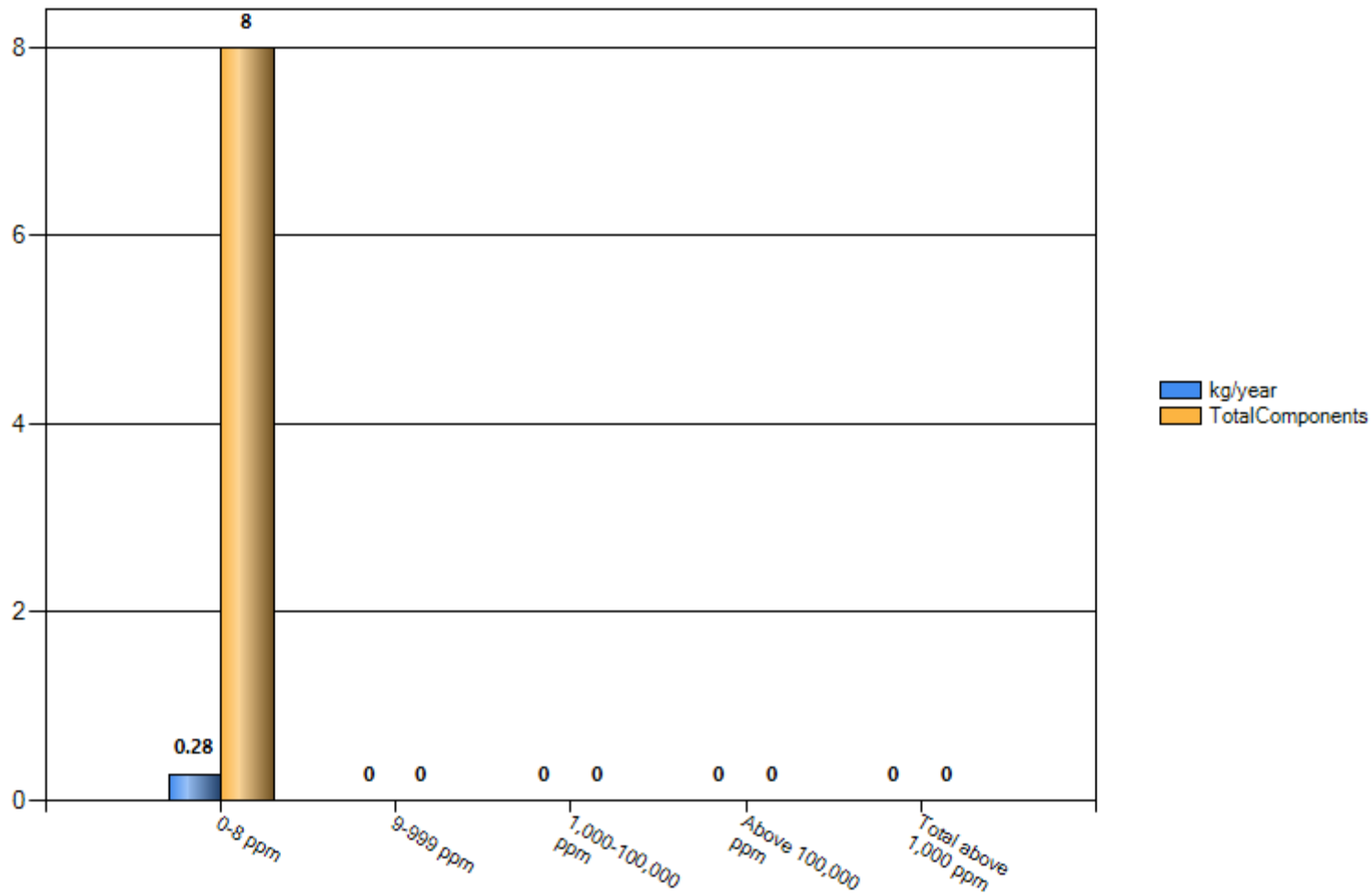
Graphs Round 4 First measurement.

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

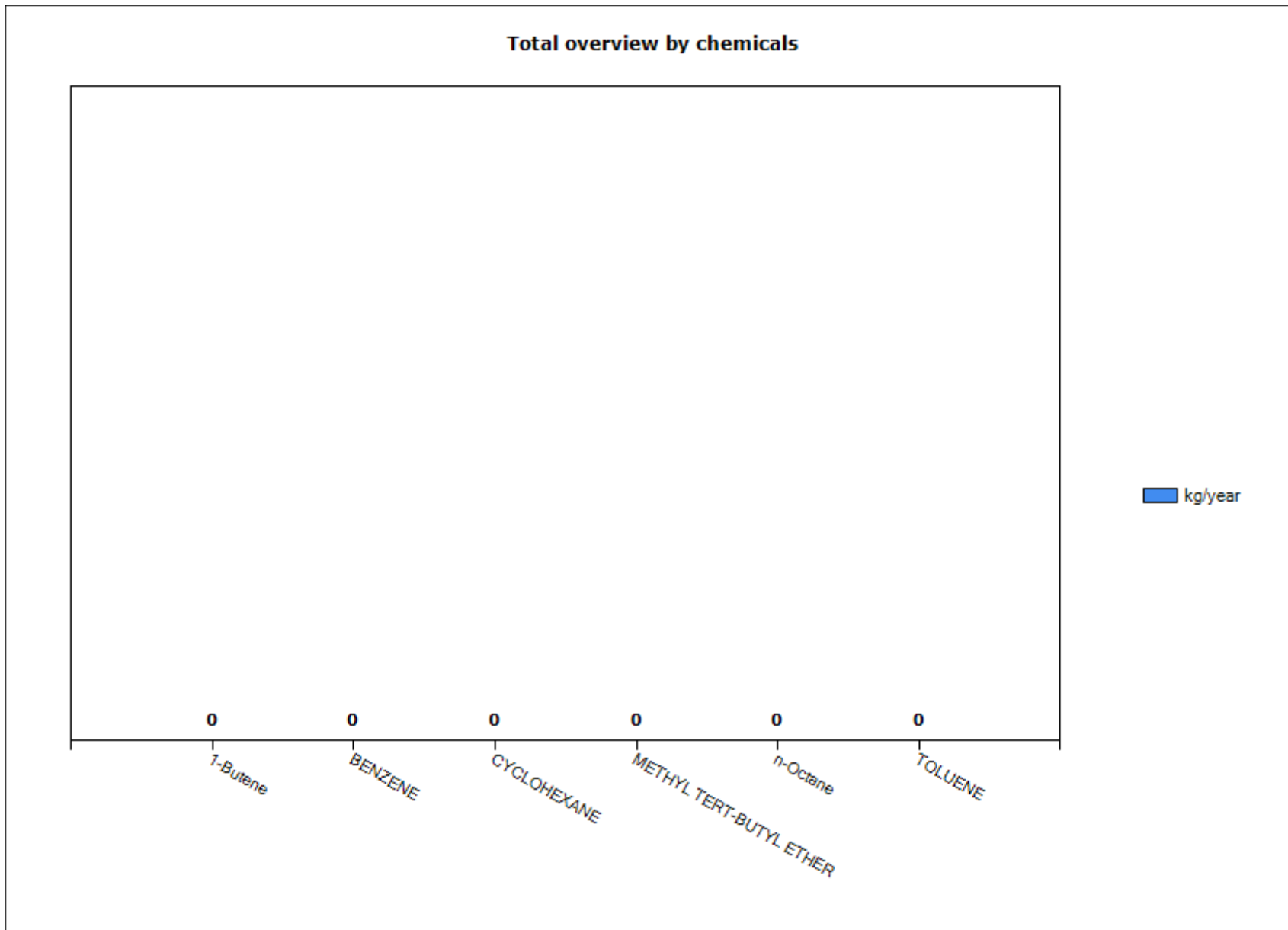
Comparison between count of sources & kg/year, by sources

Total overview by chemicals

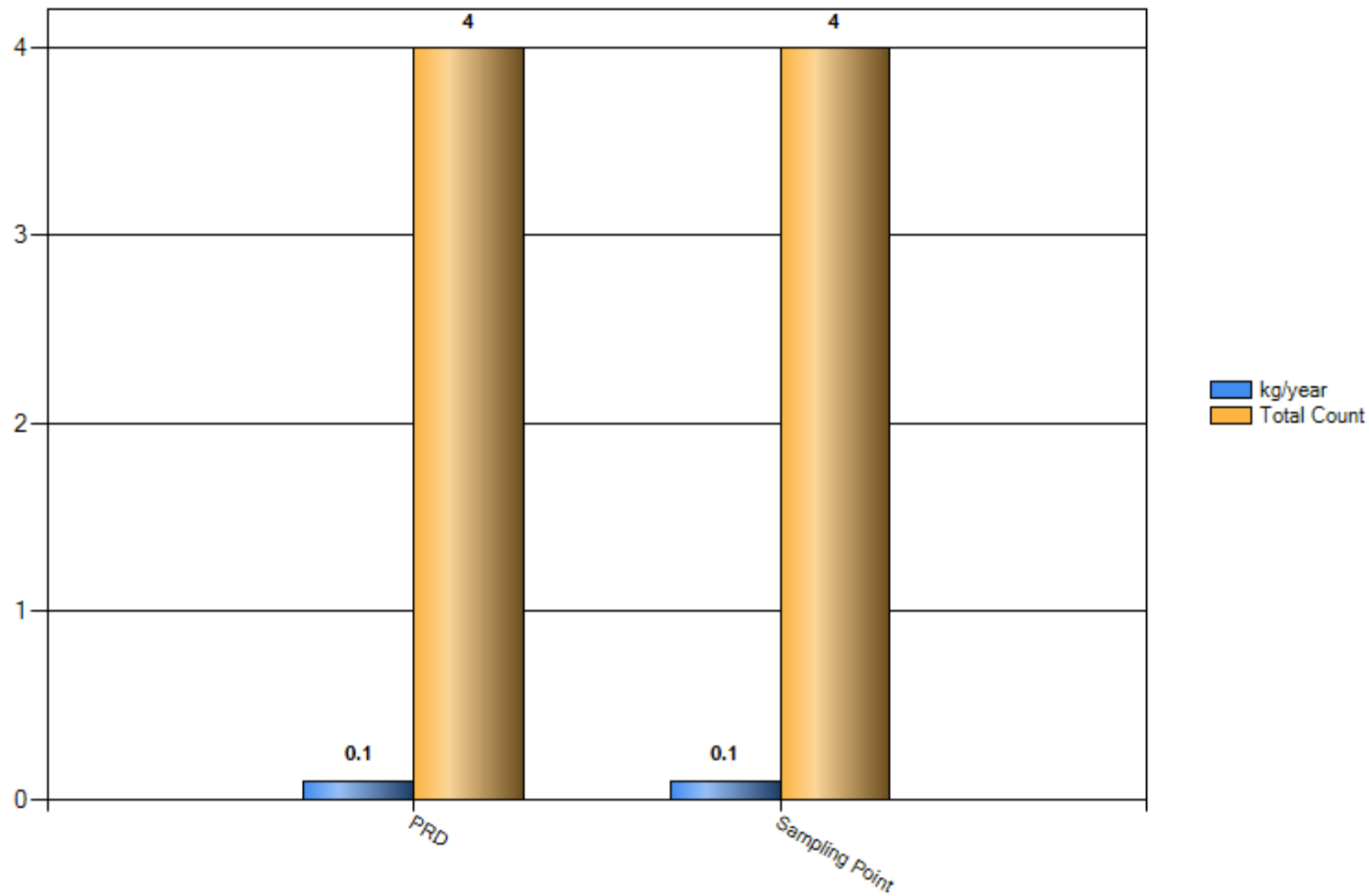
Overview by reading range



Graph6.1.1 R4



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



Graph6.1.2 R4



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Graphs Round 4

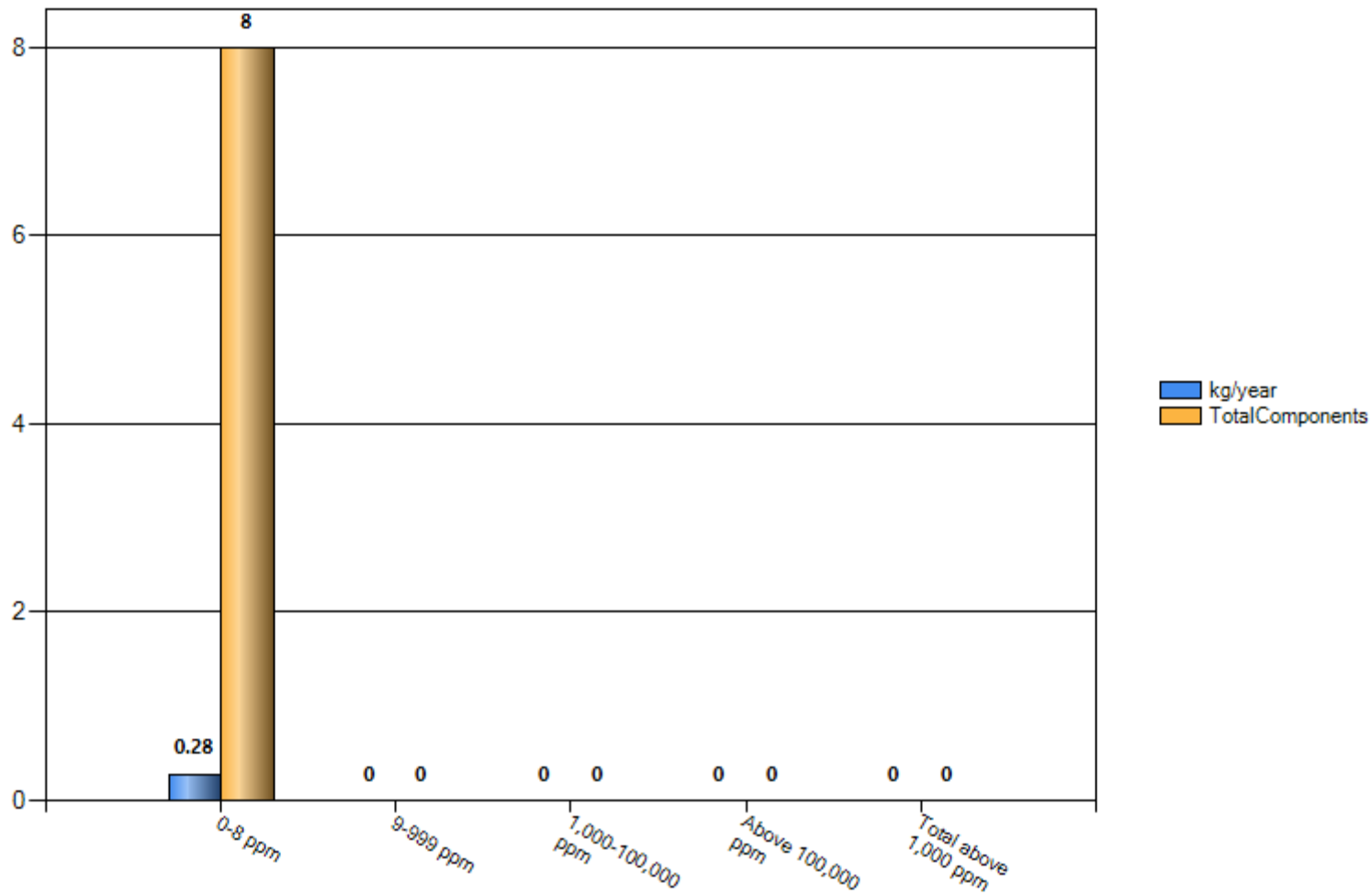
Measurement after repair attempt.

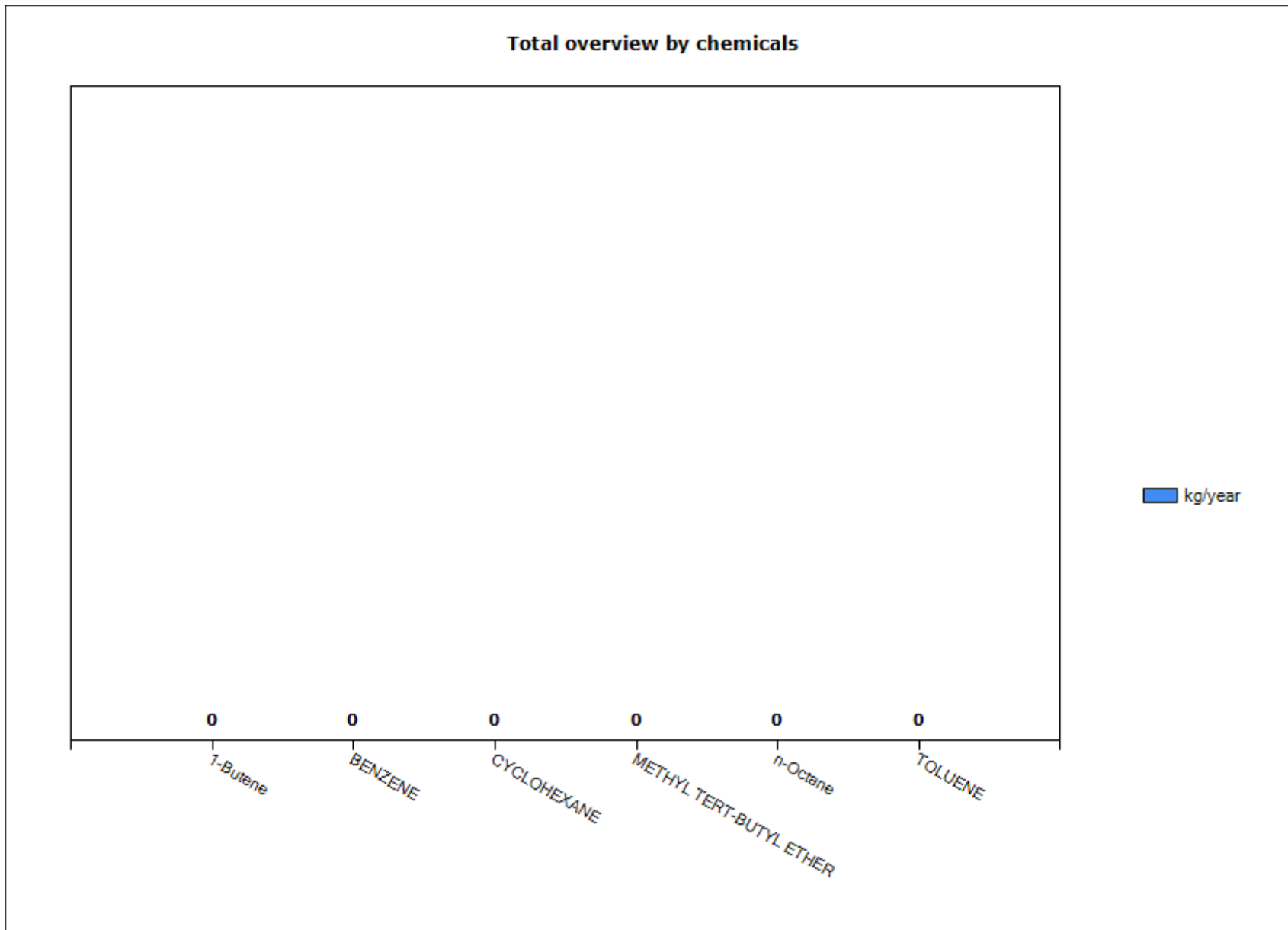
Comparison between count of sources & kg/year, by reading range

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

Total overview by chemicals

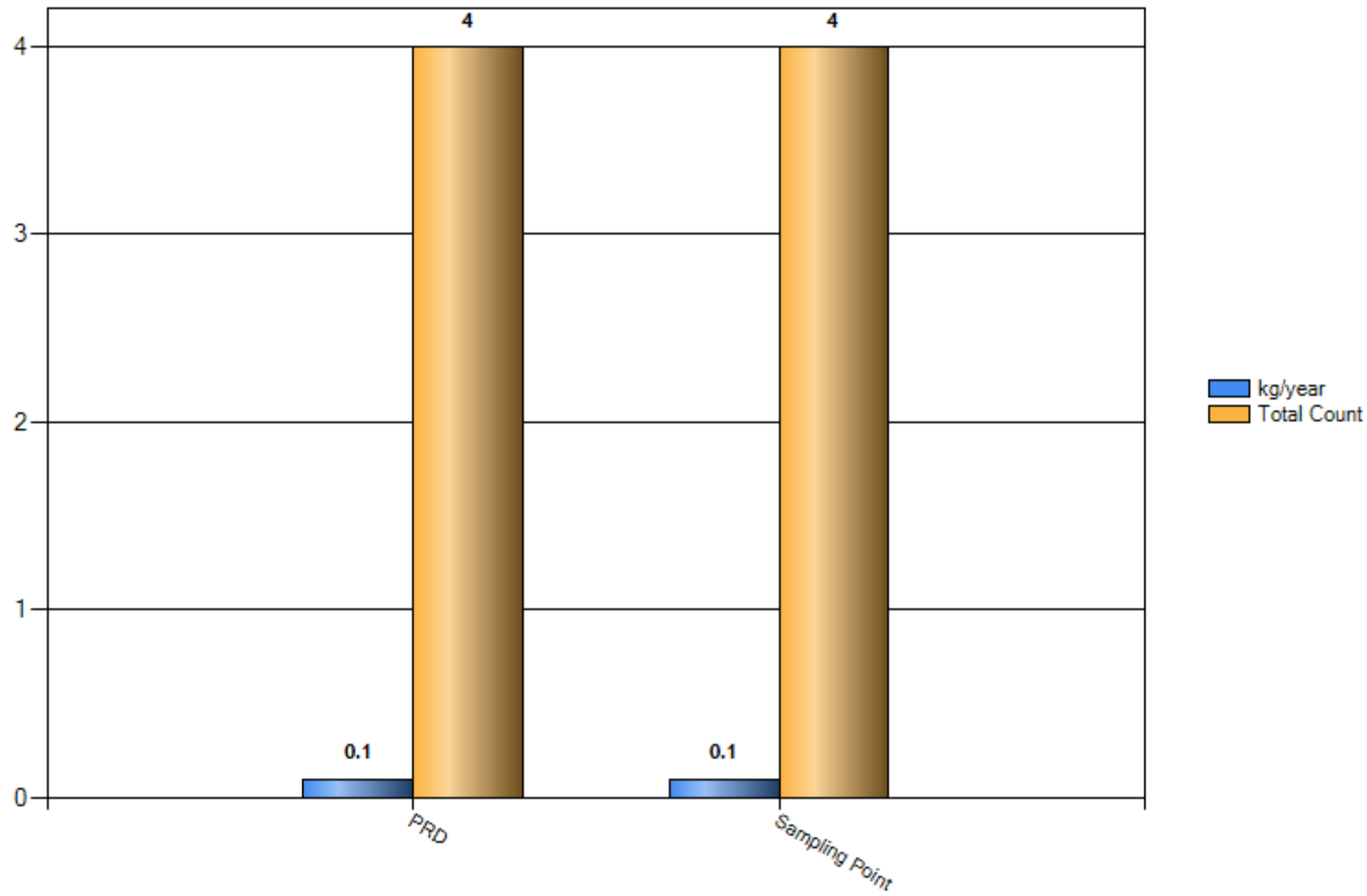
Overview by reading range





Graph6.2.3 R4

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





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Environmental Services and Solutions

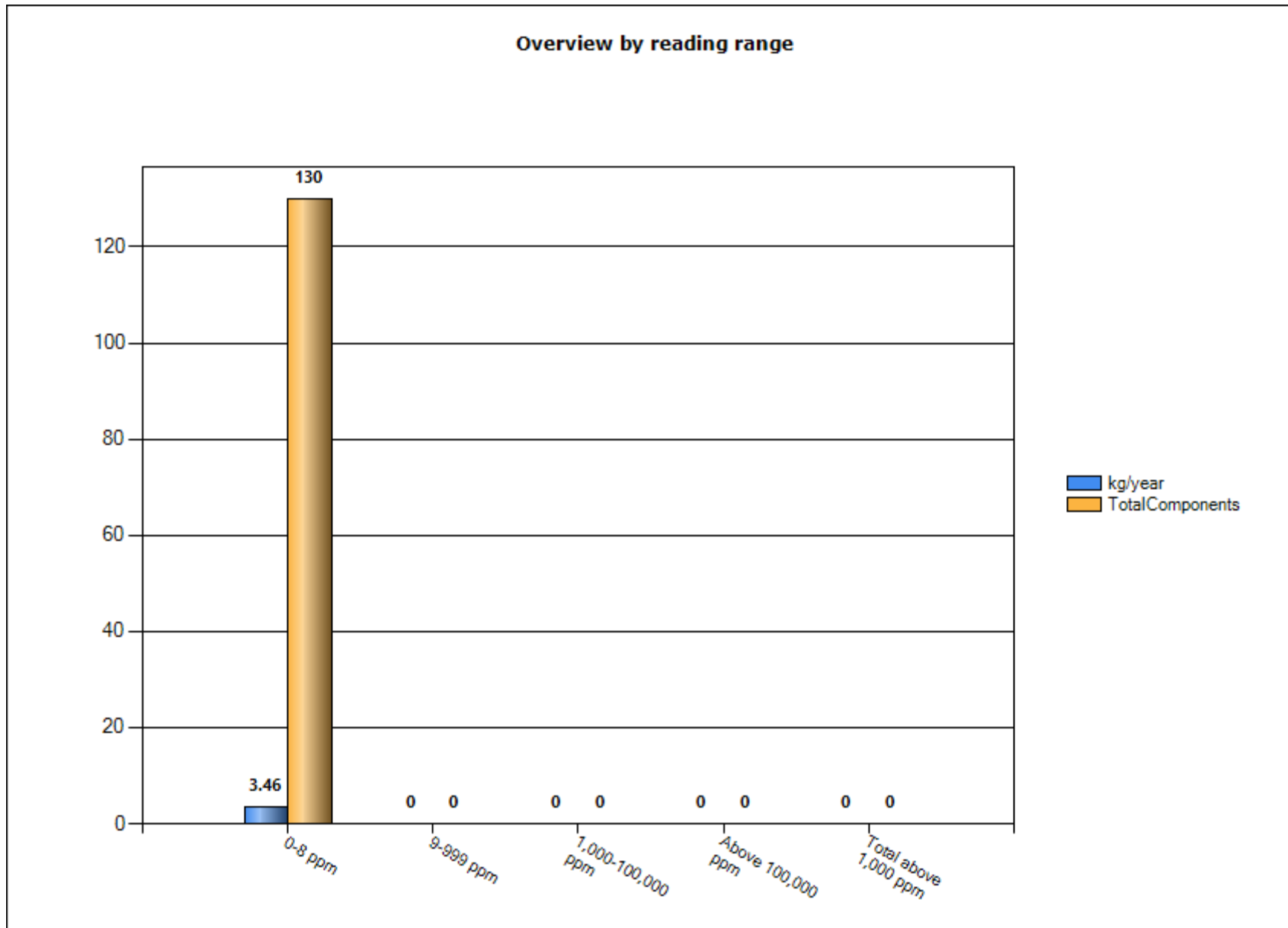
POB 13337, HaPrat Str. 2, Yavne, 8122702, Israel.
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Mobile: +972-52-7361309, E-mail: michael@labs-eco.com

Graphs Round 5 First measurement.

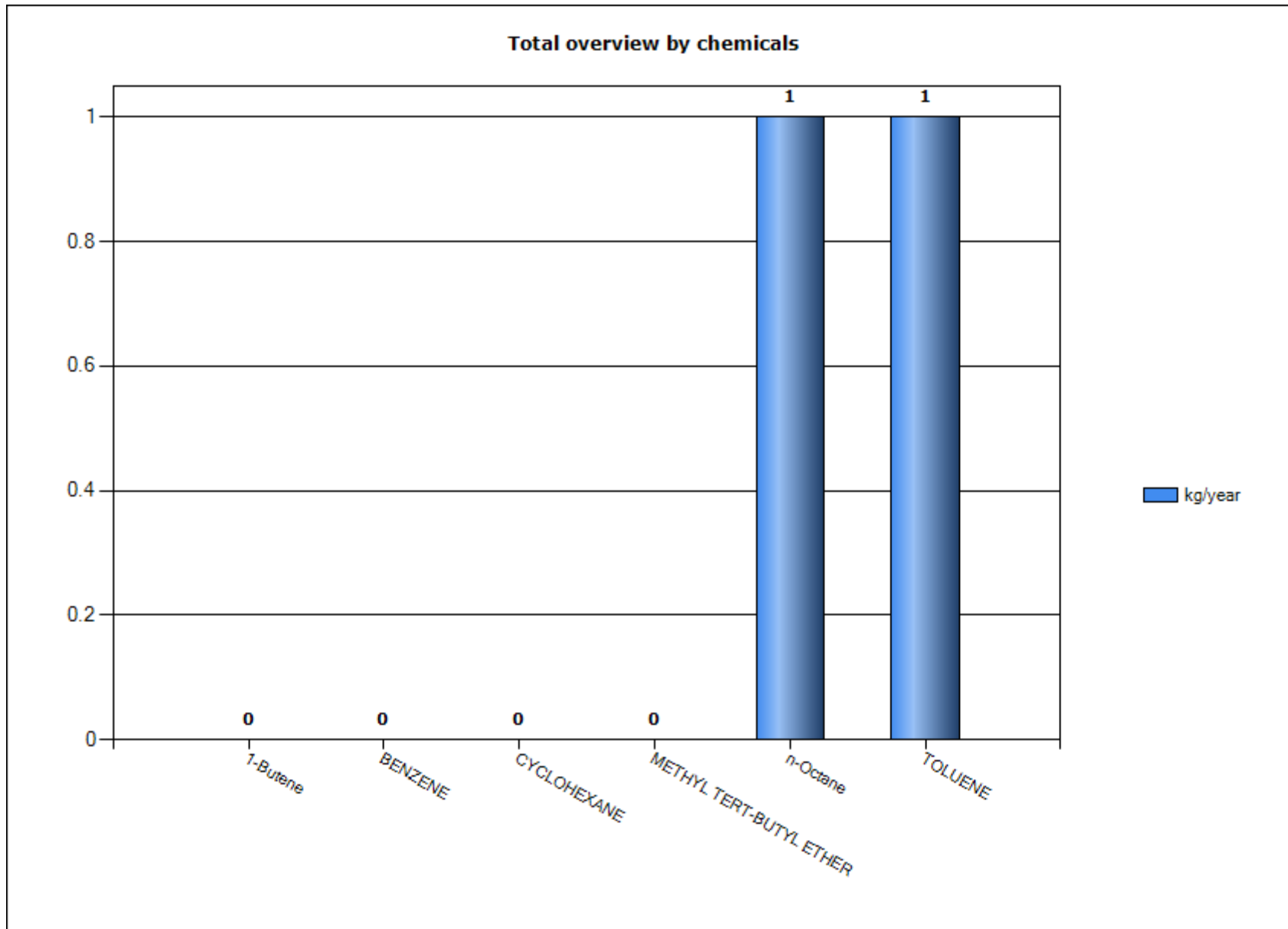
Comparison between count of sources & kg/year, by reading range

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

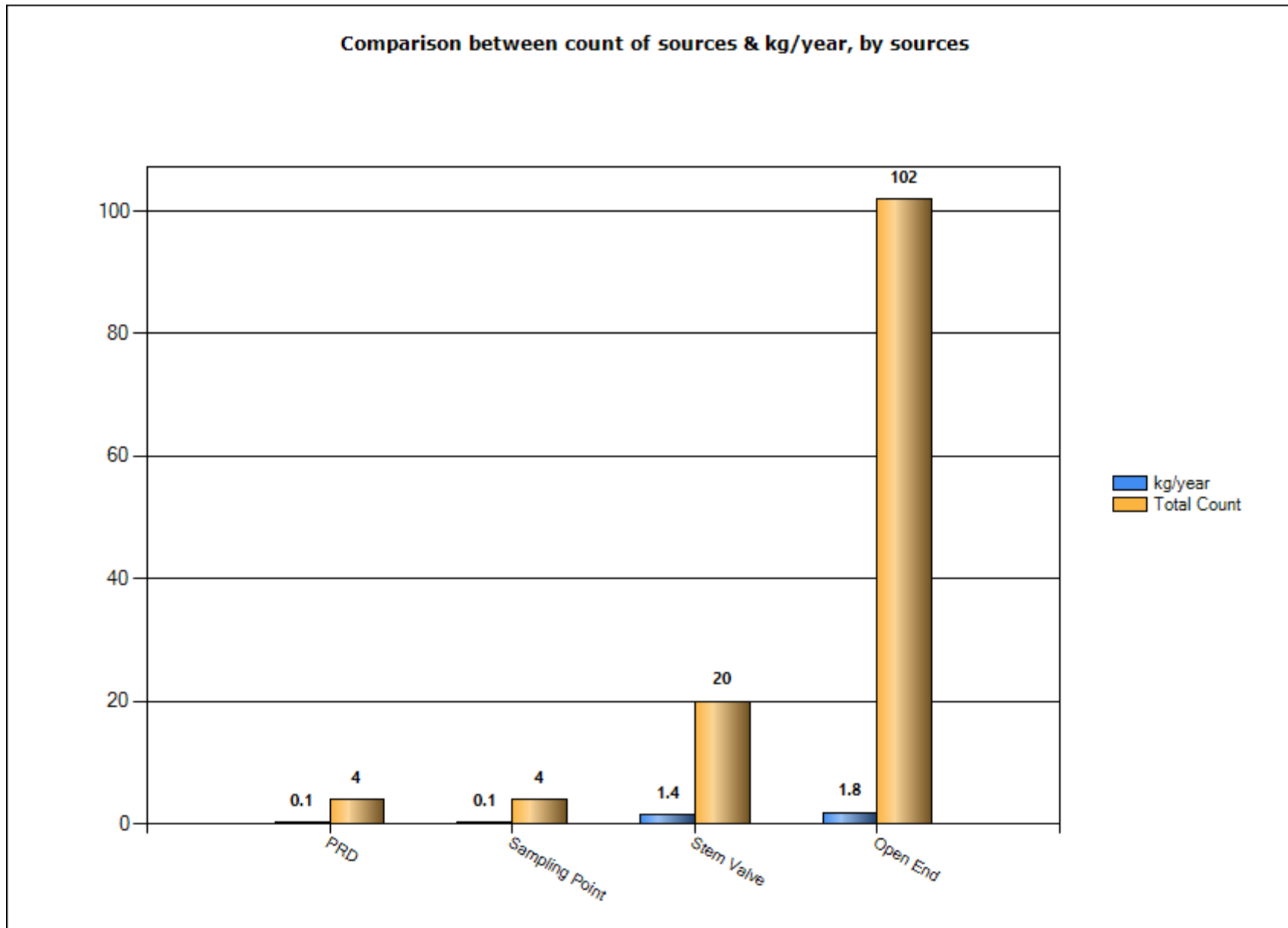
Total overview by chemicals



Graph6.1.1 R5



Graph6.1.3 R5





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Graphs Round 5

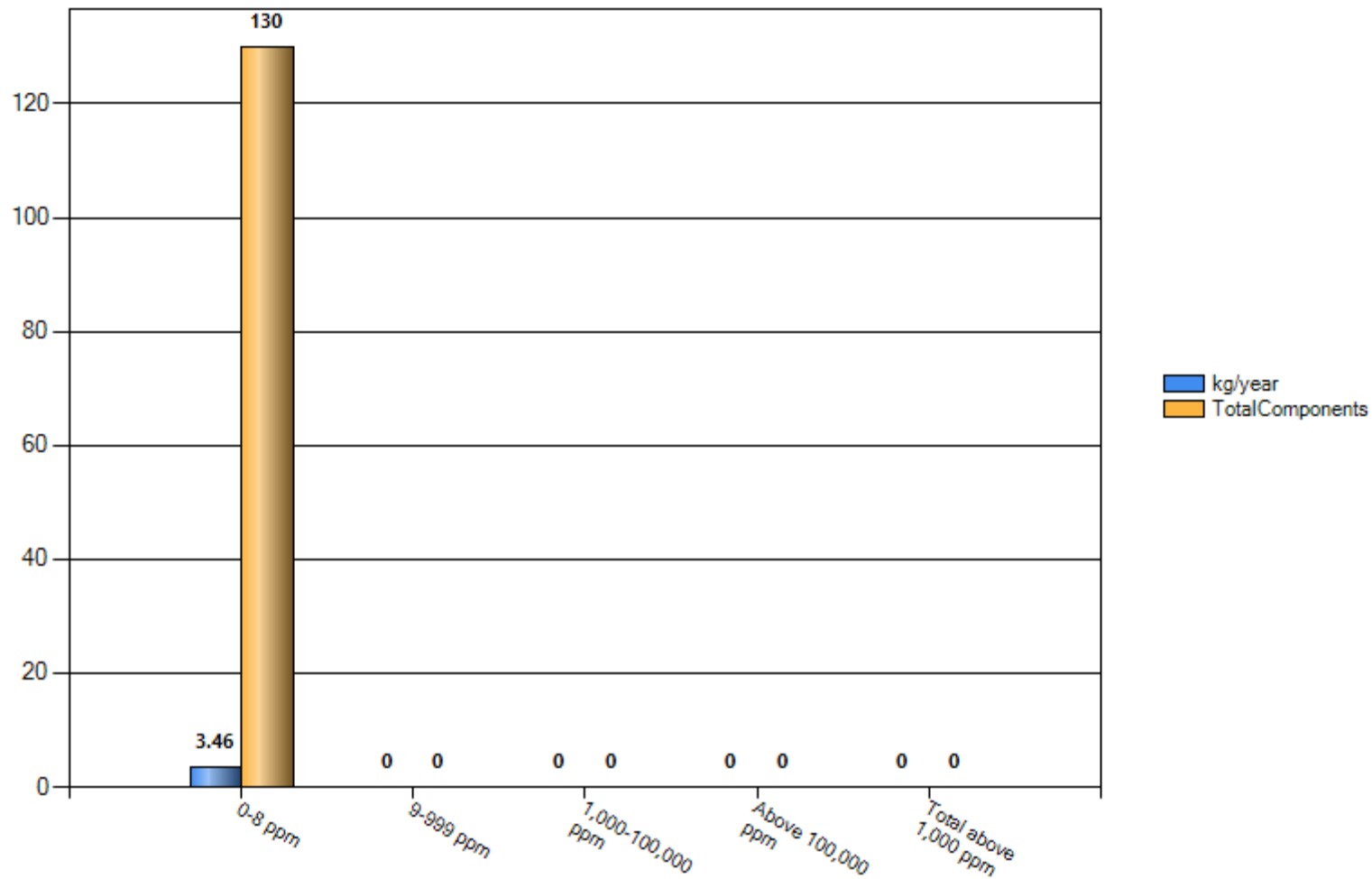
Measurement after repair attempt.

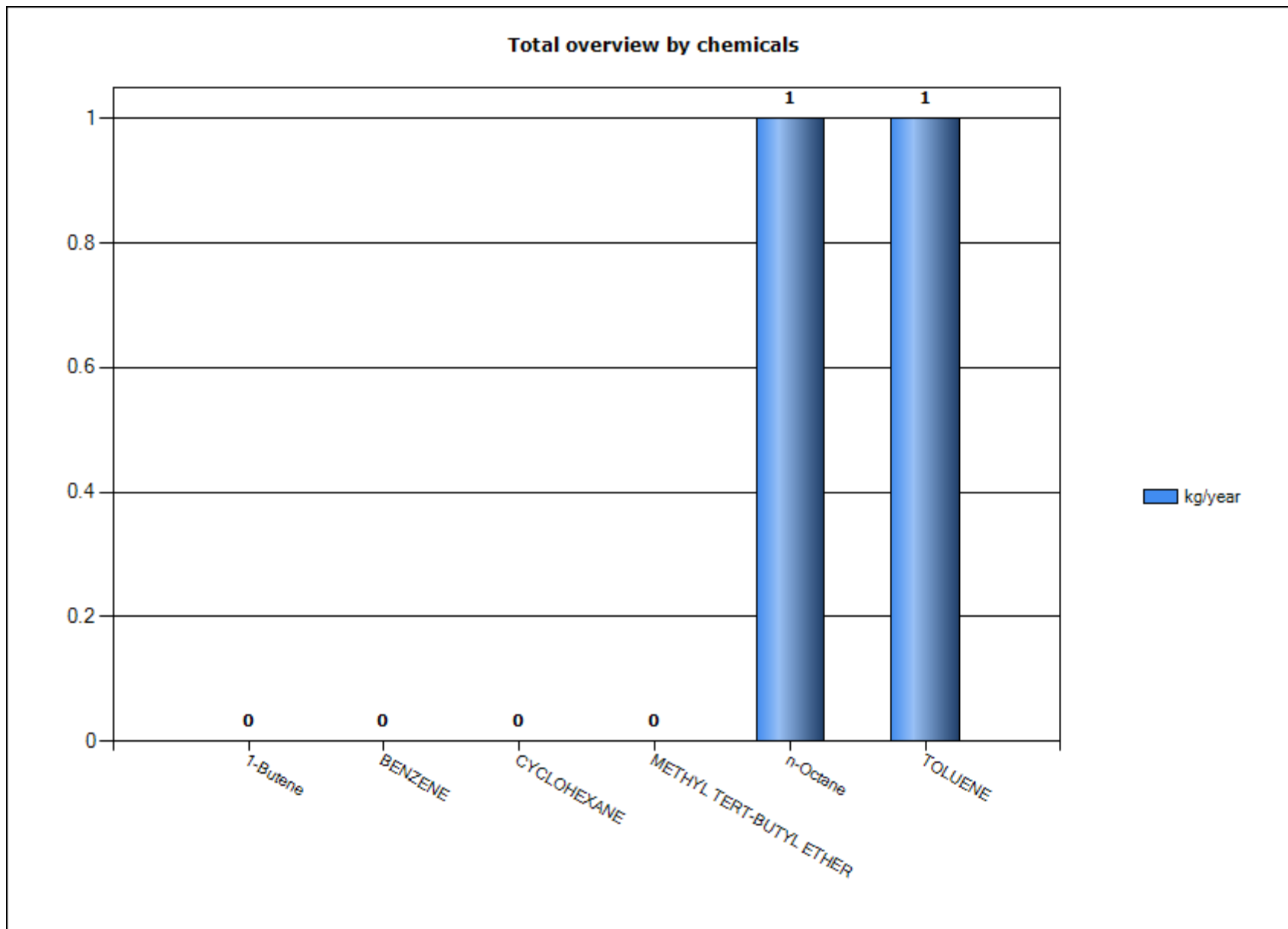
Comparison between count of sources & kg/year, by reading range

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

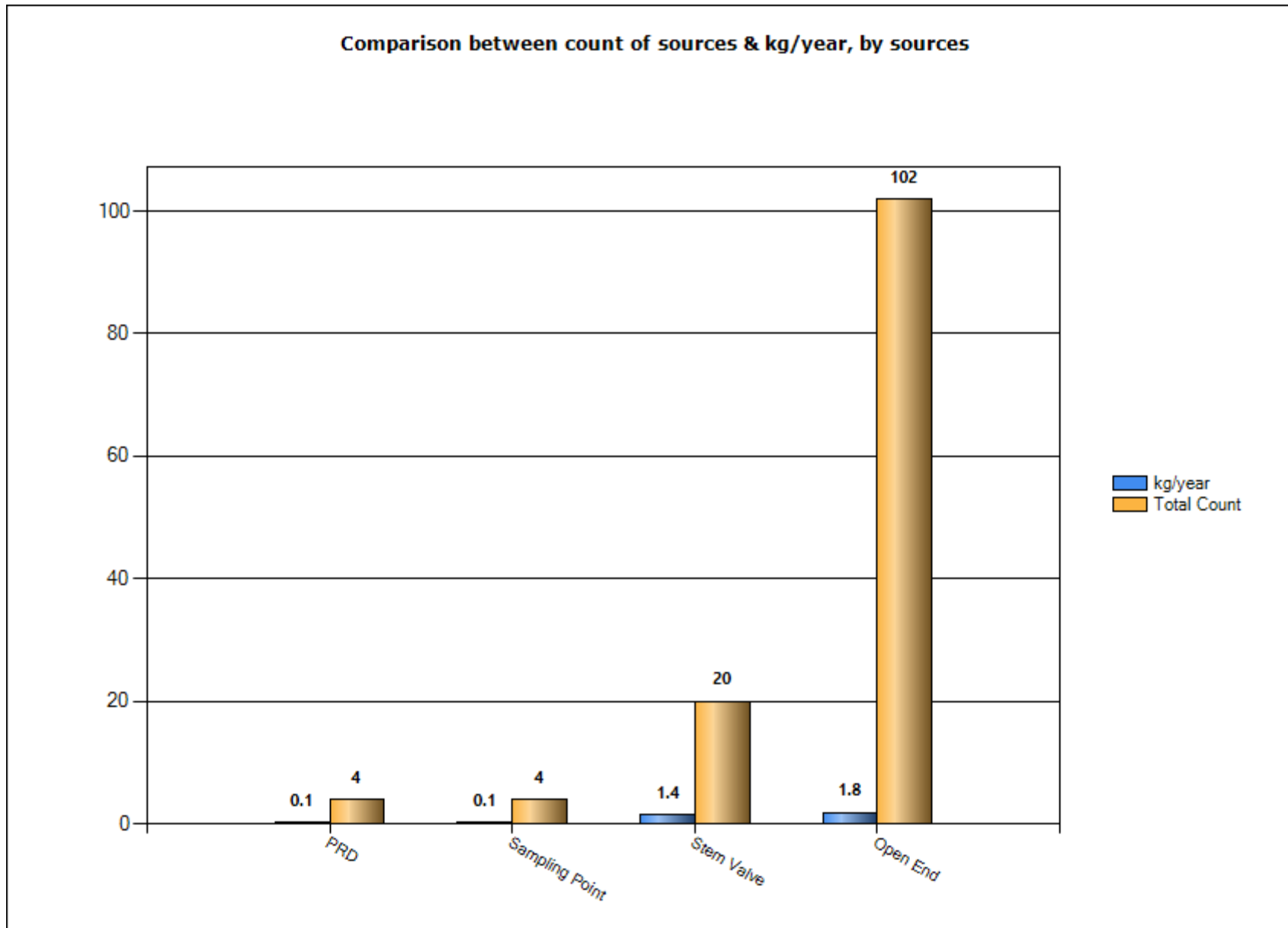
Total overview by chemicals

Overview by reading range





Graph6.2.3 R5





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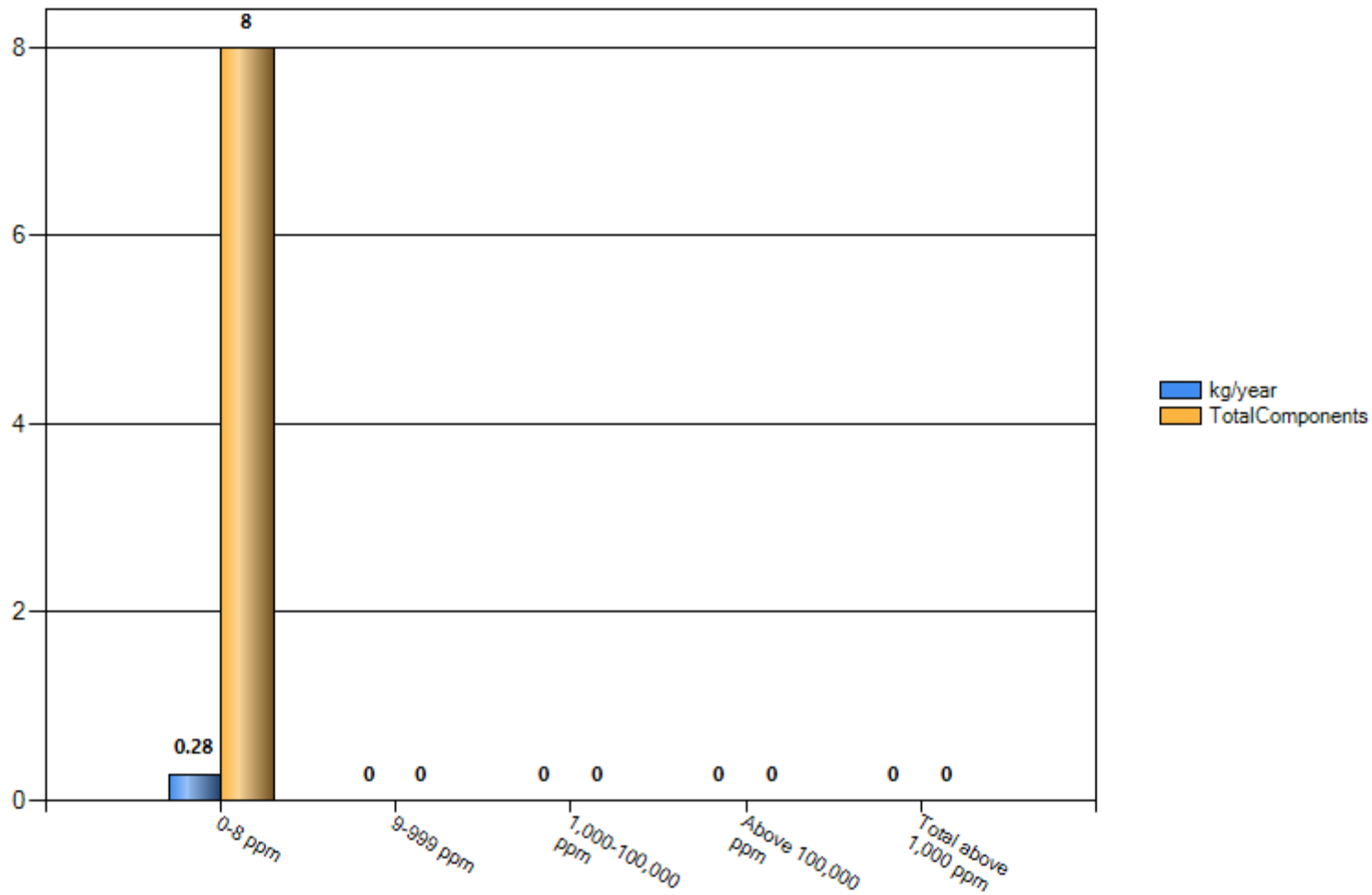
Graphs Round 6 First measurement.

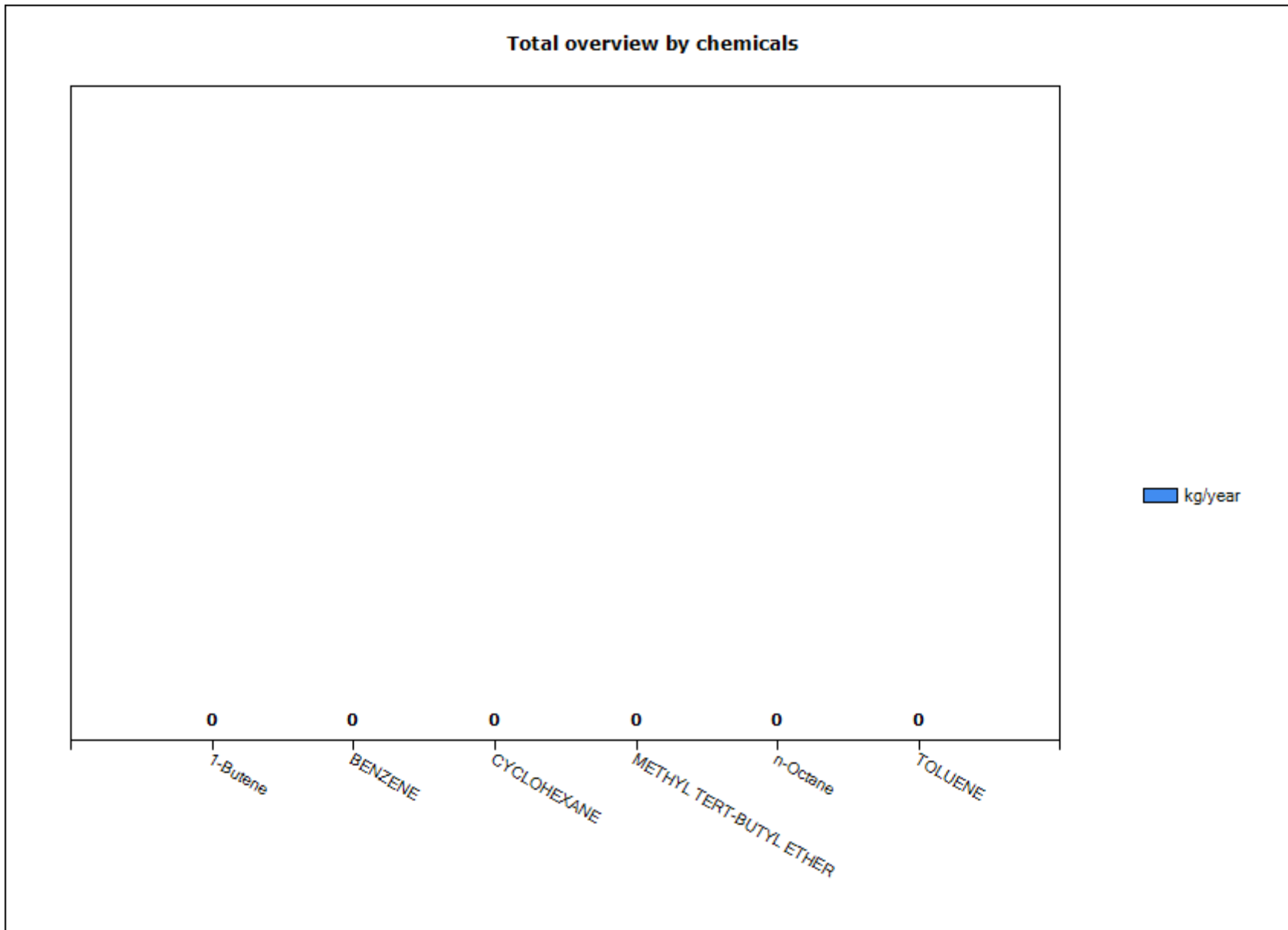
Comparison between count of sources & kg/year, by reading range

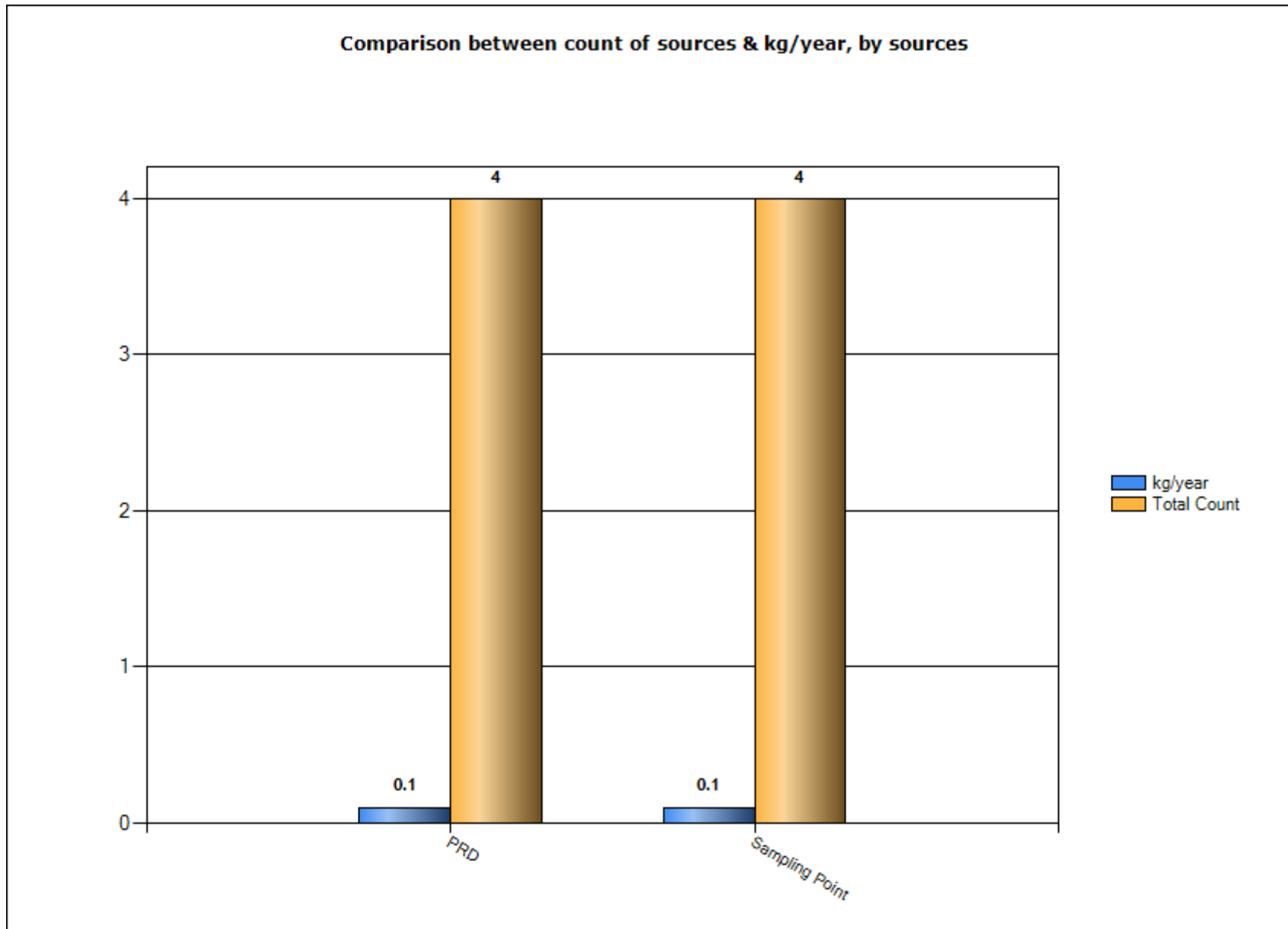
Comparison between count of sources & kg/year, by sources

Total overview by chemicals

Overview by reading range







Graph6.1.2 R6



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Graphs Round 6

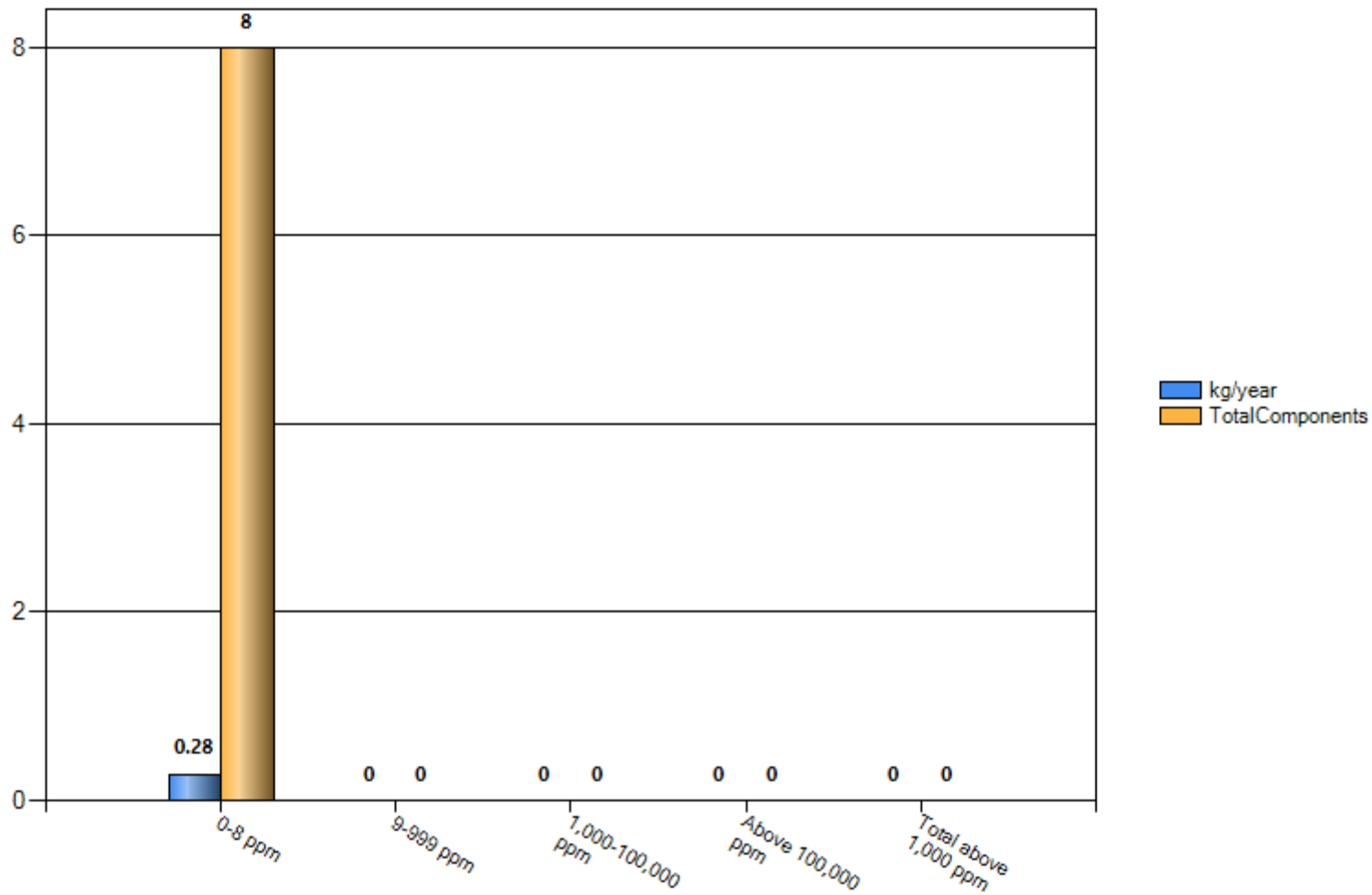
Measurement after repair attempt.

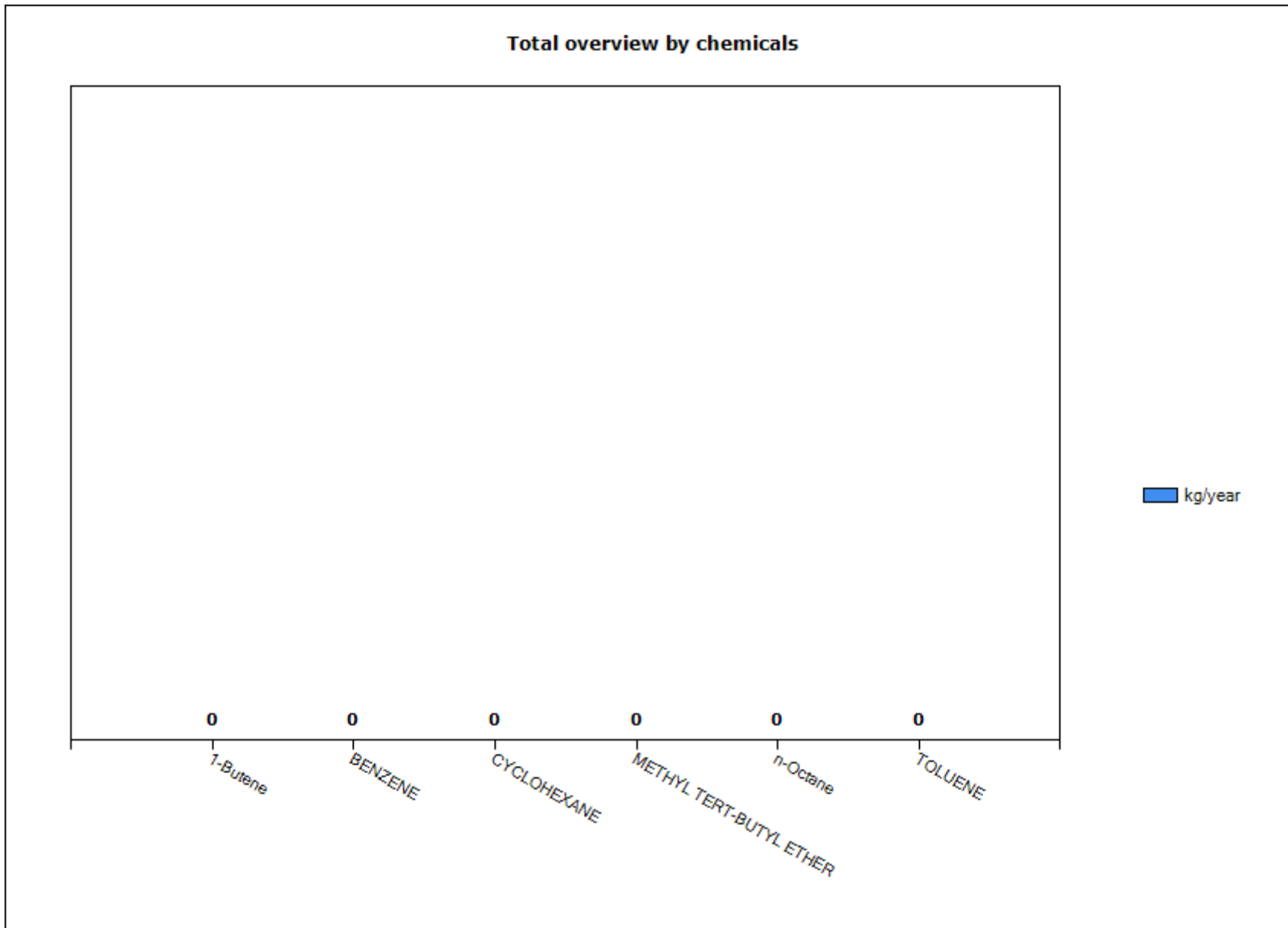
Comparison between count of sources & kg/year, by reading range

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

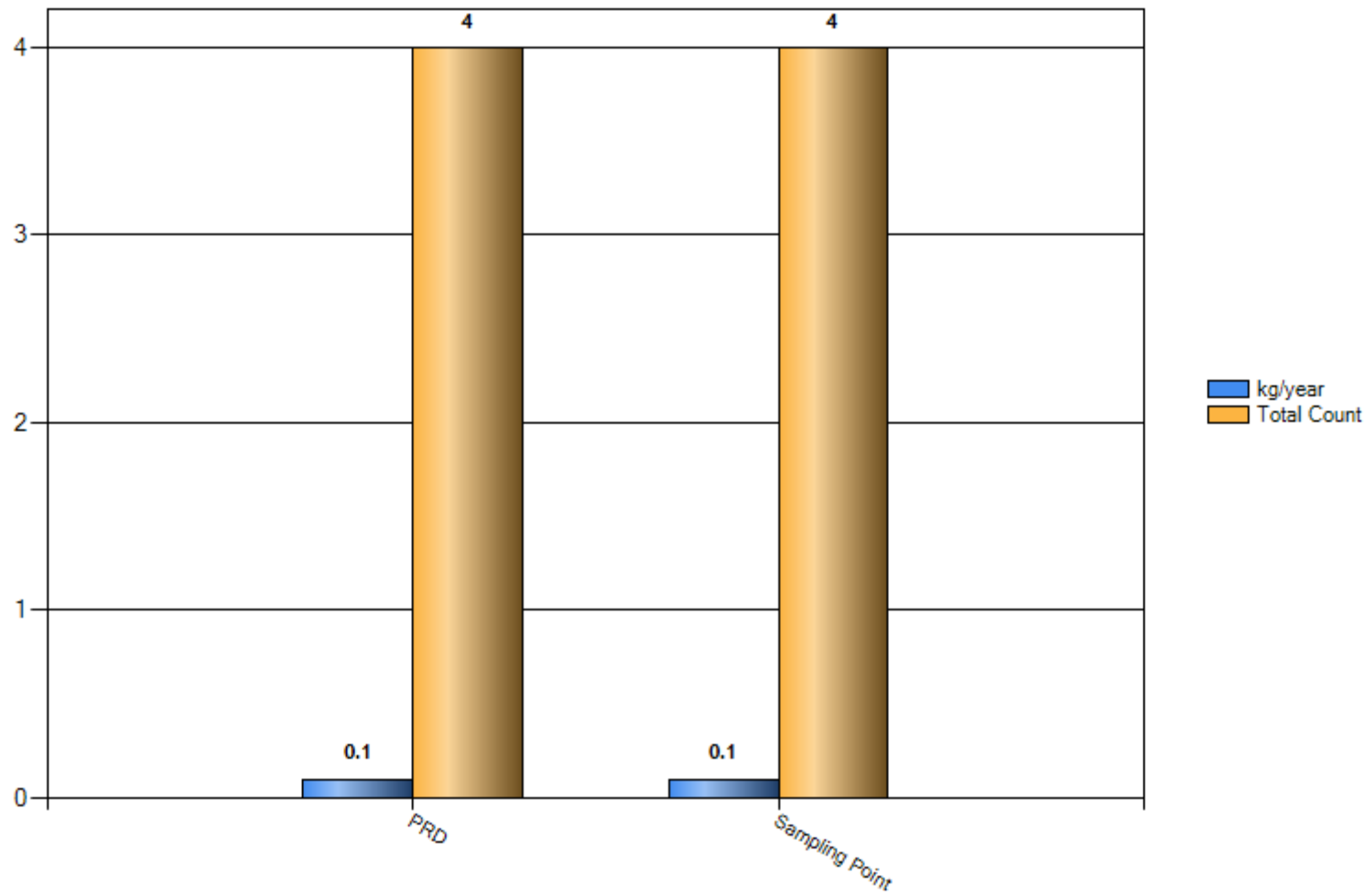
Total overview by chemicals

Overview by reading range





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





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Mobile: +972-52-7361309, E-mail: michael@labs-eco.com

Graphs

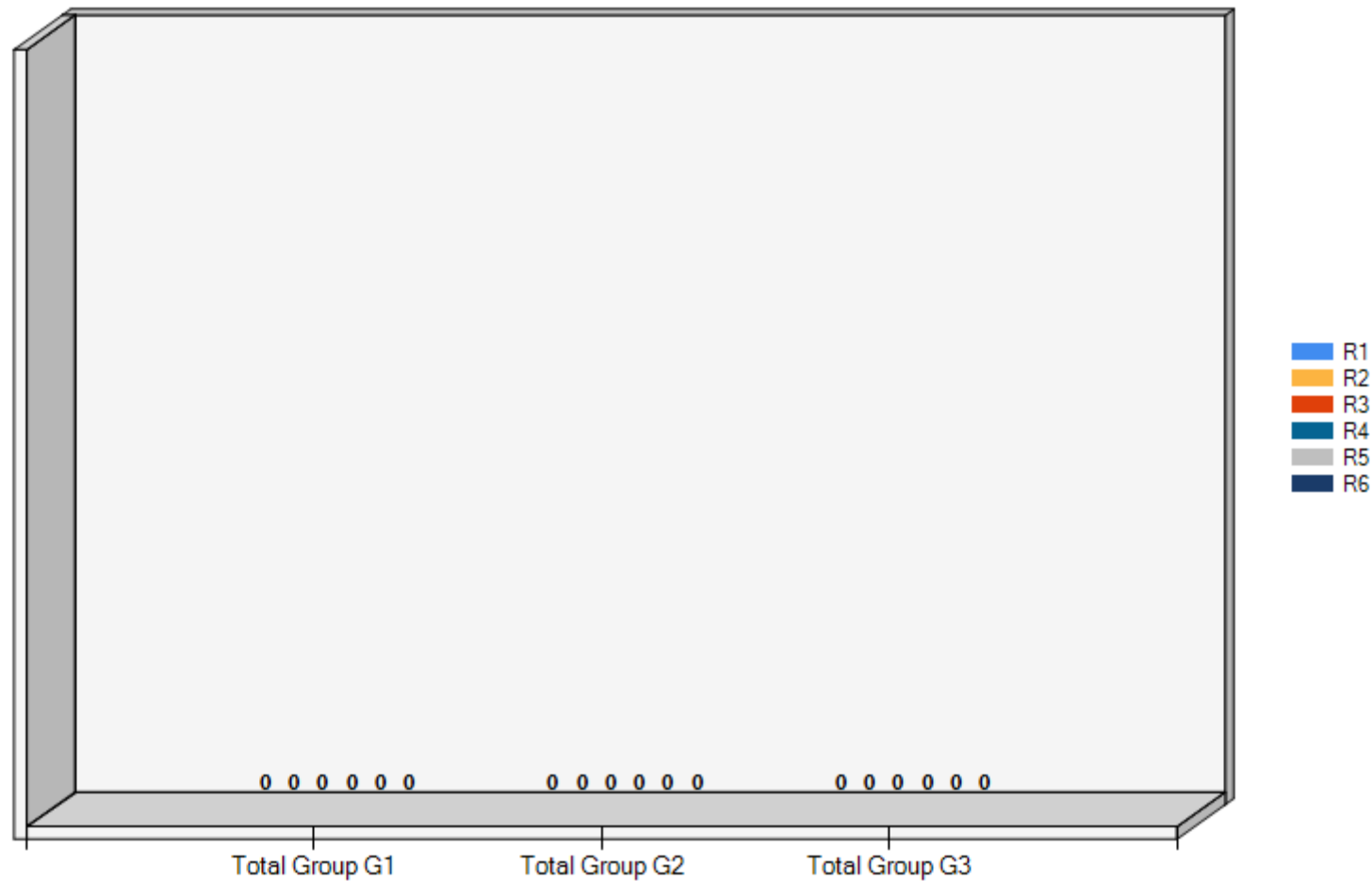
Cumulative data for period 01-01-2019-31-12-2019

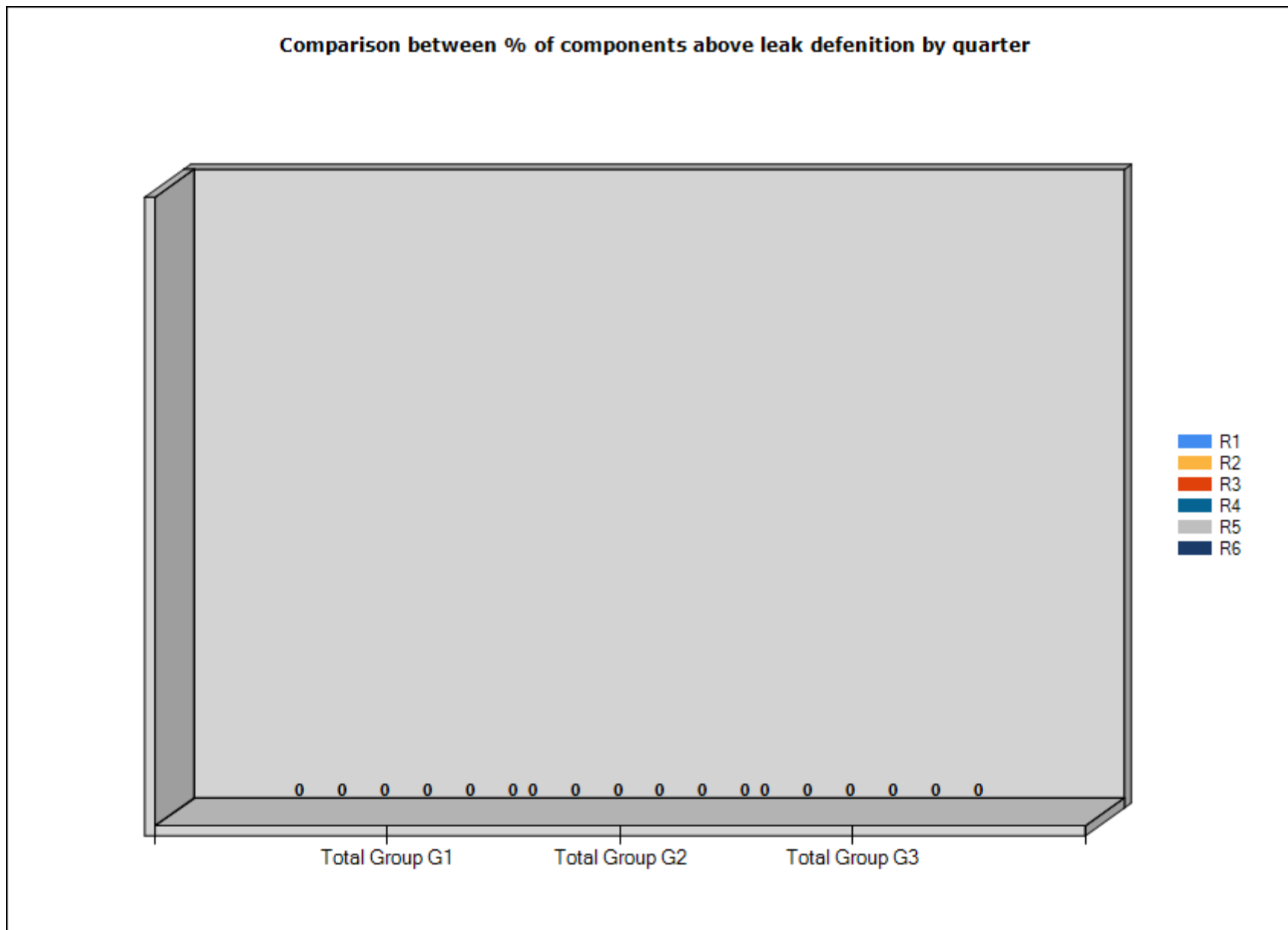
Comparison between count of sources & kg/year, by reading range

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

Total overview by chemicals

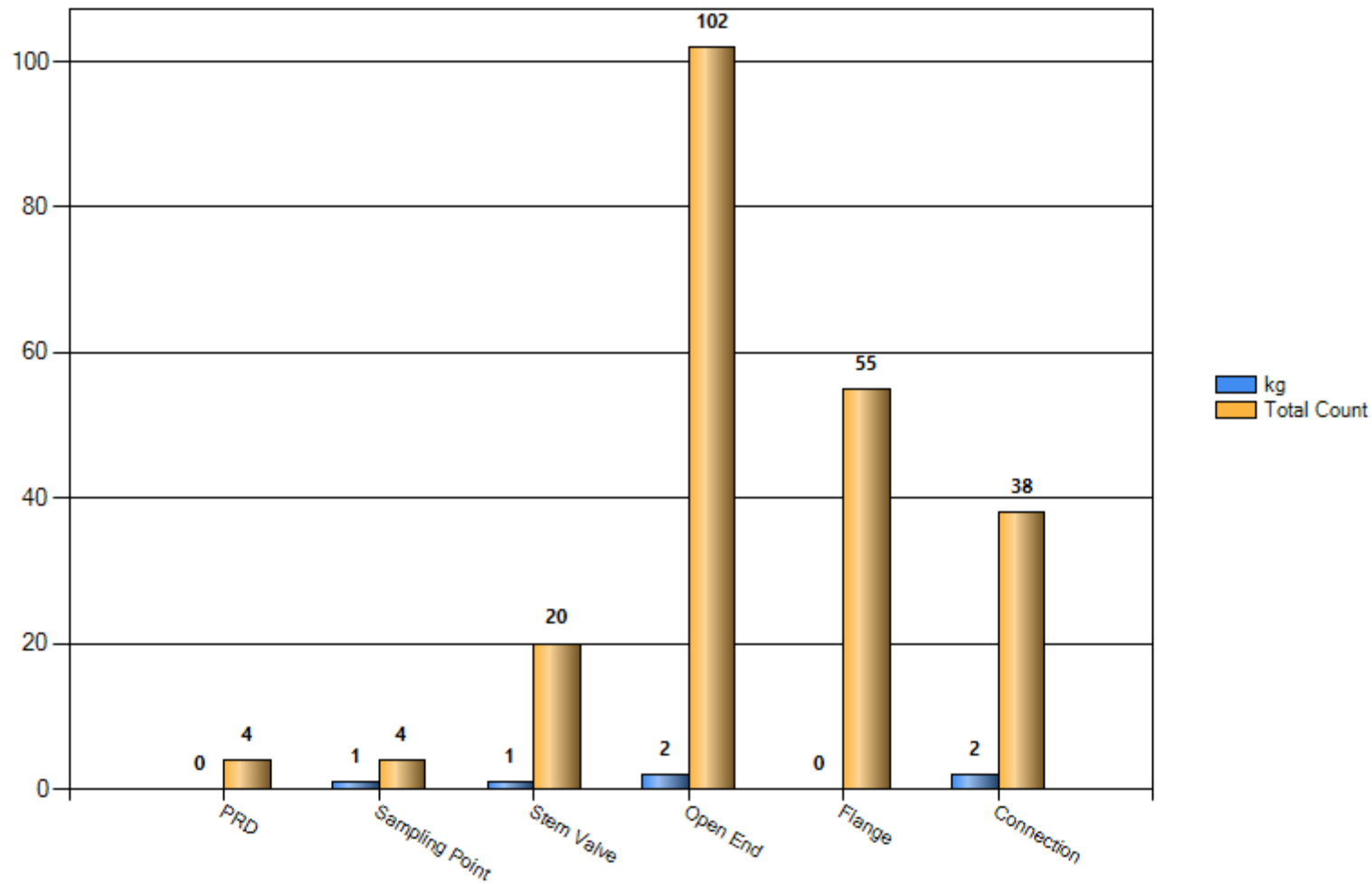
Comparison between count of components above leak defenition, by quarter



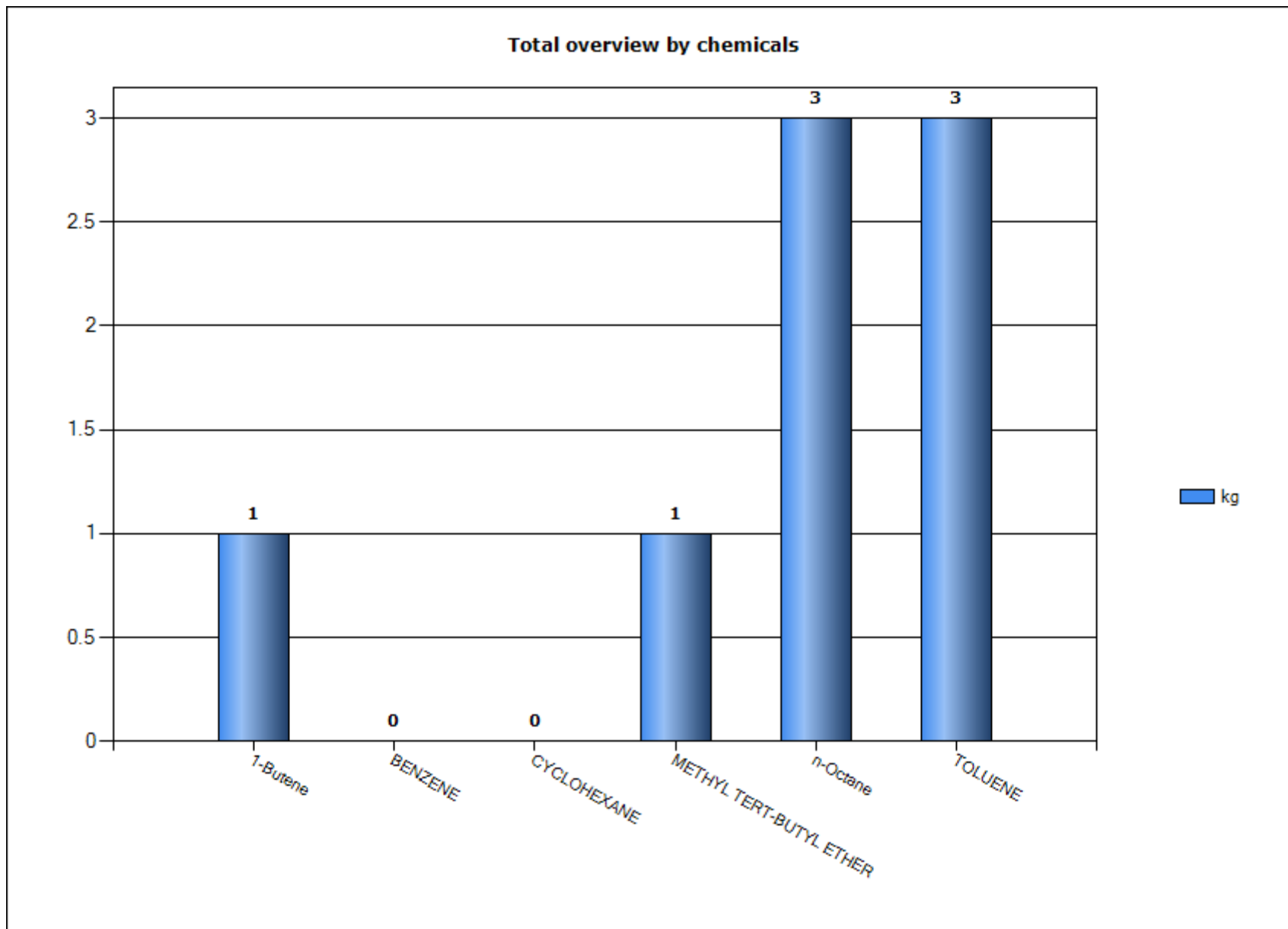


Graph6.3.2

Comparison between count of sources & kg, by sources



Graph6.3.3



Graph6.3.4



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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	1-st check (A1) ppm	2-st check (A2) ppm	3-st check (A3) ppm	Calibration error (CP)	Result
TASHAN	1	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	07-Jan-2019	5	202016061436	505	507	507	0.46%	OK
TASHAN	2	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	10-Jan-2019	1	0715622657	501	501	501	-0.60%	OK
TASHAN	2	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	10-Jan-2019	5	202016061436	506	505	505	0.26%	OK
TASHAN	2	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	25-Jan-2019	1	0715622657	491	491	491	-2.58%	OK
TASHAN	2	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	25-Jan-2019	5	202016061436	503	502	503	-0.26%	OK
TASHAN	2	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	07-Mar-2019	1	0715622657	496	496	495	-1.65%	OK
TASHAN	2	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	07-Mar-2019	5	202016061436	503	503	503	-0.20%	OK
TASHAN	2	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	03-Apr-2019	1	0715622657	500	500	500	-0.79%	OK
TASHAN	2	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	03-Apr-2019	5	202016061436	504	504	504	0.00%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	02-May-2019	3	0115248937	502	503	504	-0.20%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	02-May-2019	5	202016061436	502	504	504	-0.13%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	05-May-2019	3	0115248937	511	510	510	1.26%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	05-May-2019	5	202016061436	503	503	504	-0.13%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	12-May-2019	1	0715622657	502	502	503	-0.33%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51428	1,000	Methane	FF524456	504	12-May-2019	2	0115248185	505	505	507	0.33%	OK
TASHAN	3	TVA2020	FID	Air, THC < 0.5ppm	Methane	ET0022865	995	Methane	FF16599	501	13-May-2019	5	202016061436	504	505	504	0.46%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	ET0022865	995	Methane	FF16599	501	12-Jun-2019	2	0115248185	510	510	511	1.66%	OK
TASHAN	3	TVA1000B	FID	Air, THC < 0.5ppm	Methane	ET0022865	995	Methane	FF16599	501	12-Jun-2019	3	0115248937	503	503	503	0.20%	OK
TASHAN	4	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51430	1,000	Methane	FF524456	504	02-Sep-2019	5	202016061436	503	502	502	-0.33%	OK
TASHAN	4	TVA2020	FID	Air, THC < 0.5ppm	Methane	FF51430	1,000	Methane	FF524456	504	15-Sep-2019	5	202016061436	509	508	508	0.86%	OK
TASHAN	4	TVA1000B	FID	Air, THC < 0.5ppm	Methane	FF51430	1,000	Methane	FF524456	504	15-Sep-2019	3	0115248937	488	487	487	-3.31%	OK
TASHAN	5	TVA2020	FID	Air, THC < 0.5ppm	Methane	ET0022842	995	Methane	FF524456	504	21-Nov-2019	5	202016061436	503	502	503	-0.26%	OK
TASHAN	6	TVA2020	FID	Air, THC < 0.5ppm	Methane	ET0022842	995	Methane	FF524456	504	04-Dec-2019	5	202016061436	499	500	497	-1.06%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	ET0022842	995	Methane	FF524456	504	04-Dec-2019	2	0115248185	502	501	503	-0.40%	OK
TASHAN	5	TVA1000B	FID	Air, THC < 0.5ppm	Methane	ET0022842	995	Methane	FF524456	504	04-Dec-2019	3	0115248937	500	501	502	-0.60%	OK



an Air Liquide company

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

Part Number:	X02AI99C33AC035	Customer PO Number:	6867
Cylinder Number:	FF524456	Reference Number:	82-124579671-1
Laboratory:	124 - Riverton - NJ	Cylinder Volume:	30.3 Cubic Feet
Analysis Date:	Oct 07, 2016	Cylinder Pressure:	2100 PSIG
Lot Number:	82-124579671-1	Valve Outlet:	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. Lopez
Approved for Release

Page 1 of 82-124579671-1

Airgas
an Air Liquide company

1526/1

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



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:	FF51430	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, 2020

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



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Page 1 of 160-400903476-1

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02AI99E33A00JC	Reference Number:	82-401332856-1
Cylinder Number:	FF16599	Cylinder Volume:	32.0 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2216 PSIG
PGVP Number:	B52018	Valve Outlet:	590
Gas Code:	CH4,BALA	Certification Date:	Nov 14, 2018

Expiration Date: Nov 14, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	500.0 PPM	501.9 PPM	G1	+/- 0.7% NIST Traceable	11/14/2018
AIR	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	16060402	CC470398	500.5 PPM METHANE/NITROGEN	+/- 0.6	Jun 21, 2022

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS 2031 - CH4	FTIR	Nov 06, 2018

Triad Data Available Upon Request

NOTES: NET QTY: 2.38lbs

GROSS QTY: 18.19lbs

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2000 and relate only to items identified on this certificate. All values are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



TESTING CERT No. 3082.05

[Signature]
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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02AI99E80A3203	Reference Number:	82-401411340-1
Cylinder Number:	ET0022865	Cylinder Volume:	85.0 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52019	Valve Outlet:	590
Gas Code:	CH4,BALA	Certification Date:	Jan 31, 2019

Expiration Date: Jan 31, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE AIR	1000 PPM Balance	994.6 PPM	G1	+/- 0.8% NIST Traceable	01/31/2019

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07010320	K026312	1001 PPM METHANE/AIR	+/- 0.7%	Aug 24, 2023

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APW1100391 CH4	FTIR	Jan 10, 2019

Triad Data Available Upon Request

NOTES:

Gross Weight: 38.87lbs.

Net Weight: 6.29lbs.

PO #8579

K=2 Uncertainty 95 %

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2008 and relate only to items identified on this certificate. All values are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



TESTING CERT No. 3082.05

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Airgas Specialty Gases
Airgas USA, LLC
600 Union Landing Road
Cinnaminson, NJ 08077-0000
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02AI99E80A3203
Cylinder Number: ET0022842
Laboratory: 124 - Riverton (SAP) - NJ
PGVP Number: B52019
Gas Code: CH4,BALA

Reference Number: 82-401411340-1
Cylinder Volume: 85.0 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 590
Certification Date: Jan 31, 2019

Expiration Date: Jan 31, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE AIR	1000 PPM Balance	995.0 PPM	G1	+/- 0.9% NIST Traceable	01/31/2019
CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07010320	K026312	1001 PPM METHANE/AIR	+/- 0.7%	Aug 24, 2023
ANALYTICAL EQUIPMENT					
Instrument/Make/Model	Analytical Principle		Last Multipoint Calibration		
Nicolet 6700 APW1100391 CH4	FTIR		Jan 10, 2019		

Triad Data Available Upon Request

NOTES:

Gross Weight: 38.87lbs.

Net Weight: 6.29lbs.

PO #8579

K=2 Uncertainty 95 %

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2008 and relate only to items identified on this certificate. All values are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



TESTING CERT No. 3082.05

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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: 26-Dec-2018			Quarter: 1			Sampling Flow Rate Check		Accuracy Check										Response Time				Comparison between two Devices				
Equipment No	Equip.Ser. No	Equipment Type	Analyzer	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	507	513	507	0.99%	OK	900	4	4	4	OK	1.45	1.74	-0.29	16.67%	OK
2	0115248185	TVA1000B	FID	Methane	FF51430	1,000	1.13	OK	Methane	FF524456	504	495	497	497	-1.52%	OK	900	4	4	4	OK	2.11	1.98	0.13	-6.57%	OK
3	0115248937	TVA1000B	FID	Methane	FF51430	1,000	1.13	OK	Methane	FF524456	504	515	510	512	1.65%	OK	900	4	4	4	OK	1.22	1.15	0.07	-6.09%	OK
5	202016061436	TVA2020	FID	Methane	FF51430	1,000	1.09	OK	Methane	FF524456	504	501	500	501	-0.66%	OK	900	3	3	3	OK	2.24	2.11	0.13	-6.16%	OK
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.5	OK	Isobutylene	EA0009962	997	995	994	994	-0.35%	OK	898	4	4	4	OK	2.5	2.1	0.4	-19.05%	OK

Quarterly Validation of LDAR Devices

Date: 31-Mar-2019			Quarter: 2				Sampling Flow Rate Check		Accuracy Check								Response Time				Comparison between two Devices					
Equipment No	Equip.Ser. No	Equipment Type	Analyzer	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	OK	Methane	FF524456	504	495	502	501	-0.93%	OK	900	3	3	3	OK	2.2	2.14	0.06	-2.8%	OK
2	0115248185	TVA1000B	FID	Methane	FF51430	1,000	1.36	OK	Methane	FF524456	504	497	500	502	-0.86%	OK	900	3	3	3	OK	2.14	2.2	-0.06	2.73%	OK
3	0115248937	TVA1000B	FID	Methane	FF51430	1,000	1.26	OK	Methane	FF524456	504	495	501	502	-0.93%	OK	900	3	3	3	OK	2.18	2.35	-0.17	7.23%	OK
5	202016061436	TVA2020	FID	Methane	FF51430	1,000	0.99	OK	Methane	FF524456	504	504	505	505	0.13%	OK	900	3	3	3	OK	2.35	2.18	0.17	-7.8%	OK
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.5	OK	Isobutylene	EA0009962	997	988	987	987	-1.05%	OK	898	3	3	3	OK	2.04	2.11	-0.07	3.32%	OK

Quarterly Validation of LDAR Devices

Date: 02-Jul-2019			Quarter: 3	Sampling Flow Rate Check			Accuracy Check										Response Time					Comparison between two Devices				
Equipment No	Equip.Ser. No	Equipment Type	Analyzer	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	ET0022842	995	0.98	OK	Methane	FF524456	504	496	498	498	-1.32%	OK	895.5	4	4	4	OK	2.51	2.53	-0.02	0.79%	OK
2	0115248185	TVA1000B	FID	Methane	ET0022842	995	1.12	OK	Methane	FF524456	504	501	500	500	-0.73%	OK	895.5	4	4	4	OK	1.72	1.69	0.03	-1.78%	OK
3	0115248937	TVA1000B	FID	Methane	ET0022842	995	1.09	OK	Methane	FF524456	504	502	502	502	-0.4%	OK	895.5	4	4	4	OK	1.44	1.5	-0.06	4%	OK
5	202016061436	TVA2020	FID	Methane	ET0022842	995	1.05	OK	Methane	FF524456	504	504	504	504	0%	OK	895.5	4	4	4	OK	2.1	2.08	0.02	-0.96%	OK
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.51	OK	Isobutylene	EA0009962	997	995	995	995	-0.28%	OK	898	4	4	4	OK	3	3	0	0%	OK

Quarterly Validation of LDAR Devices

Date: 01-Oct-2019			Quarter:	4			Sampling Flow Rate Check		Accuracy Check										Response Time					Comparison between two Devices				
Equipment No	Equip.Ser. No	Equipment Type	Analyzer	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	ET0022842	995	0.98	OK	Methane	FF524456	504	507	506	507	0.53%	OK	895.5	3	4	3	OK	2.17	2.22	-0.05	2.25%	OK		
2	0115248185	TVA1000B	FID	Methane	ET0022842	995	1.12	OK	Methane	FF524456	504	500	500	501	-0.73%	OK	895.5	4	4	3	OK	1.47	1.8	-0.33	18.33%	OK		
3	0115248937	TVA1000B	FID	Methane	ET0022842	995	1.09	OK	Methane	FF524456	504	503	506	505	0.13%	OK	895.5	3	4	4	OK	2.85	2.71	0.14	-5.17%	OK		
5	202016061436	TVA2020	FID	Methane	ET0022842	995	1.05	OK	Methane	FF524456	504	500	502	499	-0.73%	OK	895.5	3	3	4	OK	2.03	1.88	0.15	-7.98%	OK		
6		MiniRAE2000	PID	Isobutylene	EA0009962	997	0.51	OK	Isobutylene	EA0009962	997	995	995	995	-0.28%	OK	898	4	4	4	OK	3	3	0	0%	OK		

CUMULATIVE PRODUCTION HOURS TEMPLATE 2019

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	2,160	2,184	2,208	2,208
Alroy	6006-100-007	Gasoline		8,760	2,160	2,184	2,208	2,208

נספח ג'

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

3013.16-034-T2

3013.16-025

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 condition	חום טובה	0.58	Table 7.1-6 Brown
Roof color and condition	α	color condition	לבן טוב	0.17	Table 7.1-6
Tank paint solar absorptance	α	dimensionless		0.38	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	$V_V = \pi(D)^2/4 * H_{VO}$	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: $P_V = nRT \rightarrow$ $P_2 = P_1 * (T_2/T_1)$	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	44	T2 - B&W 2019
		Kg per year	---	20	
Total emissions (Breathing & Working)		lb per year	Tanks Program	79	T2 - B&W 2019
		Kg per year	---	36	
Breathing (standing) losses		Kg per year		16	

5. Degassing and Cleaning (Tanks program)

Degassing: emission from one turnover of floating roof	$E_{\text{degass-floating}}$	lb per emptying	Tanks Program	59.04	T2 - DFloating 2019
		Kg per emptying	---	27	
Degassing: fixed roof with a height of roof legs	$E_{\text{degass-legs}}$	lb per emptying	Tanks Program	61	T2- DFixed 2019 (Only working losses)
		Kg per emptying	---	28	
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	$E_{\text{degass-total}} = E_{\text{degass-floating}} + E_{\text{degass-legs}} + E_{\text{cleaning}}$	24,811	
		Kg per emptying		11,254	

6. Roof landing

Daily average liquid surface temperature	T_{LA}	°R	$T_{LA} = 0.44T_{AA} + 0.56T_B + 0.0079 * \alpha * I$	532.17	Equation 1-26
Daily vapor temperature range	ΔT_V	°R	$\Delta T_V = 0.72\Delta T_A + 0.028 * \alpha * I$	32.95	Equation 1-8
Daily maximum liquid surface temperature	T_{LX}	°R	$T_{LX} = T_{LA} + 0.25\Delta T_V$	540.41	Figure 7.1-17
Daily minimum liquid surface temperature	T_{LN}	°R	$T_{LN} = T_{LA} - 0.25\Delta T_V$	523.93	Figure 7.1-17
Liquid bulk temperature	T_B	°R	$T_B = T_{AA} + 6\alpha - 1$	527.22	Equation 1-28
Max standing idle losses during roof landing	L_{SL-max}	lb per landing episode	$L_{SL-max} = 5.9 * D^2 * h_{le} * W_I$	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	$K_E = \frac{\Delta T_V}{T_{LA}} + \frac{\Delta P_V - \Delta P_B}{P_A - P_{VA}}$	0.028	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	$L_{SL} = n_d K_E \left(\frac{PV_V}{RT_{AA}} \right) M_V K_S$	5	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	$L_{TL} = L_{SL} + L_{FL}$	46	Equation 2-10
		Kg per landing episode		21	

7. Summary

Working (withdrawal) losses		Kg per year		20	
Breathing (standing) losses		Kg per year		16	
Total Degassing and Cleaning emissions		Kg per year		750	
Total losses during roof landing		Kg per year		1	
				788	Kg per year

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

Identification

User Identification:	T2 - B&W 2019
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:	0.78

Paint Characteristics

Internal Shell Condition:	Dense Rust
Shell Color/Shade:	Aluminum/Diffuse
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
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

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

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

T2 - B&W 2019 - 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	76.52	65.35	87.69	68.86	0.0136	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 2019 - External Floating Roof Tank
Haifa, Israel

Annual Emission Calculations	
Rim Seal Losses (lb):	34.5005
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:	0.0002
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0136
Tank Diameter (ft):	160.0100
Vapor Molecular Weight (lb/lb-mole):	130.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	43.8093
Annual Net Throughput (gal/yr.):	5,946,910.0000
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):	0.8398
Value of Vapor Pressure Function:	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	27.8819
Average Wind Speed (mph):	6.2000

Total Losses (lb): 79.1496

Roof Fitting/Status		Quantity	KFa(lb-mole/yr)	Roof Fitting Loss Factors		m	Losses(lb)
				KFb(lb-mole/(yr mph ⁿ))			
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed		3	1.60	0.00		0.00	0.1446
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.		2	6.20	1.20		0.94	0.6608
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.		1	0.71	0.10		1.00	0.0345

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

Emissions Report for: Annual

T2 - B&W 2019 - External Floating Roof Tank
Haifa, Israel

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Jet kerosene	34.50	43.81	0.84	0.00	79.15

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

Identification

User Identification:	T2 - DFixed 2019
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:	Aluminum/Diffuse
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

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

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

T2 - DFixed 2019 - 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.					
Jet kerosene	Apr	72.10	62.74	81.45	67.57	0.0118	0.0092	0.0159	130.0000			162.00	Option 1: VP70 = .011 VP80 = .015

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

T2 - DFixed 2019 - Vertical Fixed Roof Tank
Haifa, Israel

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):												
Vapor Space Volume (cu ft):												
Vapor Density (lb/cu ft):												
Vapor Space Expansion Factor:												
Vented Vapor Saturation Factor:												
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):												
Tank Diameter (ft):												
Vapor Space Outage (ft):												
Tank Shell Height (ft):												
Average Liquid Height (ft):												
Roof Outage (ft):												
Roof Outage (Cone Roof)												
Roof Outage (ft):												
Roof Height (ft):												
Roof Slope (ft/ft):												
Shell Radius (ft):												
Vapor Density												
Vapor Density (lb/cu ft):												
Vapor Molecular Weight (lb/lb-mole):												
Vapor Pressure at Daily Average Liquid												
Surface Temperature (psia):												
Daily Avg. Liquid Surface Temp. (deg. R):												
Daily Average Ambient Temp. (deg. F):												
Ideal Gas Constant R												
(psia cuft / (lb-mol-deg R)):												
Liquid Bulk Temperature (deg. R):												
Tank Paint Solar Absorptance (Shell):												
Tank Paint Solar Absorptance (Roof):												
Daily Total Solar Insulation												
Factor (Btu/sqft day):												
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:												
Daily Vapor Temperature Range (deg. R):												
Daily Vapor Pressure Range (psia):												
Breather Vent Press. Setting Range(psia):												
Vapor Pressure at Daily Average Liquid												
Surface Temperature (psia):												
Vapor Pressure at Daily Minimum Liquid												
Surface Temperature (psia):												
Vapor Pressure at Daily Maximum Liquid												
Surface Temperature (psia):												
Daily Avg. Liquid Surface Temp. (deg R):												
Daily Min. Liquid Surface Temp. (deg R):												
Daily Max. Liquid Surface Temp. (deg R):												
Daily Ambient Temp. Range (deg. R):												
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:												
Vapor Pressure at Daily Average Liquid:												
Surface Temperature (psia):												
Vapor Space Outage (ft):												
Working Losses (lb):												
Vapor Molecular Weight (lb/lb-mole):												
Vapor Pressure at Daily Average Liquid												
Surface Temperature (psia):												
Net Throughput (gal/mo.):												
Annual Turnovers:												
Turnover Factor:												
Maximum Liquid Volume (gal):												
Maximum Liquid Height (ft):												
Tank Diameter (ft):												
Working Loss Product Factor:												
Total Losses (lb):												

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

Emissions Report for: Annual

T2 - DFixed 2019 - Vertical Fixed Roof Tank
Haifa, Israel

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet kerosene	60.63	32.78	93.41

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

Identification

User Identification:	T2 - DFloating 2019
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:	Aluminum/Diffuse
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
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

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

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

T2 - DFloating 2019 - 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	Apr	76.46	63.88	89.04	68.86	0.0136	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 - DFloating 2019 - External Floating Roof Tank
Haifa, Israel

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb): Seal Factor A (lb-mole/ft-yr): Seal Factor B (lb-mole/ft-yr (mph) ⁿ): Average Wind Speed (mph): Seal-related Wind Speed Exponent: Value of Vapor Pressure Function: Vapor Pressure at Daily Average Liquid Surface Temperature (psia): Tank Diameter (ft): Vapor Molecular Weight (lb/lb-mole): Product Factor:												
Withdrawal Losses (lb): Net Throughput (gal/mo.): Shell Clingage Factor (bbl/1000 sqft): Average Organic Liquid Density (lb/gal): Tank Diameter (ft):												
Roof Fitting Losses (lb): Value of Vapor Pressure Function: Vapor Molecular Weight (lb/lb-mole): Product Factor: Tot. Roof Fitting Loss Fact.(lb-mole/yr): Average Wind Speed (mph):												
Total Losses (lb):												
Roof Fitting/Status	Quantity	KFa(lb-mole/yr)	Roof Fitting Loss Factors		m		Losses(lb)					
			KFb(lb-mole/(yr mph ⁿ n))									
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	3	1.60	0.00		0.00		0.0000					
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2	6.20	1.20		0.94		0.0000					
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10		1.00		0.0000					

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

Emissions Report for: Annual

T2 - DFloating 2019 - External Floating Roof Tank
Haifa, Israel

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Jet kerosene	2.99	55.99	0.07	0.00	59.04

נספח ד'

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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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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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

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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	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

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חישובי פליטה ממכל תשטיפים

מכל תשטיפים - 60 מ³ - קרוסין

עבור כל החישובים הוצג כי נפלט קרוסין בתהליך התהליך

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	$E_{degass-legs}$	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	$E_{cleaning} = W_s \cdot (1 - F_{liquid})$	0	
		Kg per emptying		0	
Total Degassing and Cleaning emissions	$E_{degass-total}$	lb per emptying	$E_{degass-total} = E_{degass-floating} + E_{degass-legs} + E_{cleaning}$	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 ו/או לעשות שימוש כלשהו במידע הנ"ל ללא הרשאה כתובה מ"פז" הנדסה וניהול (1980) בע"מ.

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