

1681

AS MAVES

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VIIMSI KÜTUSELAO NAFTAREOSTUSE UURINGUD

VIIMSI KÜTUSELAO PIIRKONNA PÕHJAVEE MONITOORING

Juhatuse esimees



M. Metsur

Tallinn 1995

VIIMSI KÜTUSELAO PIIRKONNA PÕHJAVEE MONITOORING (1994)

Koos Viimsi kütuselao pinnasereostuse uuringutega oli kavas ka Cm-V põhjaveekihi kvaliteedi seire. 1994. aastal võeti neli korda veeproovid veevarustuses kasutusel olevatest puurkaevudest, mis asuvad maaaluste kütusetunnelite läheduses. Töö eesmärgiks oli kasutatava põhjavee võimalikult täpne analüüsimine gaaskromatograafilisel meetodil, et avastada ka väga väikeste naftaproduktide koguste sattumine põhjavette.

Kokku võeti 20 veeproovi järgmistest puurkaevudest ning järgmistel kuupäevadel:

Puurkaevu Nr. asukoht	25.01.	04.07.	11.10.	13.12.
✓ 160 Haabneeme (Nr.5)	+	+	+	+
✓ 163 Haabneeme (Nr.2)	+	+	+	+
165 Viimsi kütuseladu	+	+	+	+
✓ 159 Miiduranna	+	+	+	+
✓ 153 Viimsi park	-	+	-	-
Leivatsehh	+	-	+	+

Veeanalüüsid tehti Keskkonnauuringute Kesklaboris. Üheski veeanalüüsis ei ületanud naftaproduktide summaarne sisaldus gaaskromatograafilise määramise täpsust ($3 \mu\text{g/l}$). Ühekordne suurem sisaldus ($4,8 \mu\text{g/l}$) puuraugus 163 pole rohkem kinnitust leidnud. Sellised juhuslikud sisaldused jälgede tasemel võivad analüüsitavasse vette sattuda ka süvaveepumbast või torustikust.

Seire tulemused kinnitavad, et piirkonna Cm-V põhjavesi on puhas. Eesti joogivee standardis on lubatud naftaproduktide sisalduseks joogivees on $50 \mu\text{g/l}$. Põhjavee väga väikesest reostusvõimalusest hoolimata tuleks seiret ootamatuste välistamiseks jätkata. Vaatlustel võiks edaspidi piirduda 3-4 lähema kaevuga.

Käesolevale tööle on lisatud 11.10.94. ja 13.12.94. võetud veeanalüüside laboratoorsete dokumentide koopiad. Varasemad labori materjalid on lisatud eelmises aruandes [2].

Varasemad tööd:

1. Viimsi keskkonnoahtlike objektide inventariseerimine ja öko loogilise seisukorra hindamine. AS MAVES. Tallinn 1993.
2. Viimsi kütuselao naftareostuse uuringute II etapp, esmased tööd. AS MAVES. Tallinn 1994.

NAFTAPRODUKTIDE IDENTIFITSEERIMINE.

Meie kiri Nr.2-2/1187-1191 21.10.94.a.
Teie kiri Nr. 11.10.94.a.

Analüüsitav objekt: Veeproovid Viimsi kütuselaost
Proovi nr. ja proovivõtmise koht: PA 163 - Haabneeme keskus, pumbajaam nr.2, PA 160 - Haabneeme keskus, pumbajaam nr.5, PA 159 Miiduranna tehas, PA - leivatsehh, PA 165 - Viimsi kütuseladu.
Proovi võtja (asutus, amet, nimi): AS "MAVES", geoloog A.Krapiva.
Proovivõtmise kuupäev: 11.10.94.a. kell .
Laborisse sisse tulnud : 12.10.94.a. kell 15.15,
Analüüs alustatud : 18.20.94. a. lõpetatud : 20.10.94.a.

Analüüsi tulemus:

Gaasikromatograafilisest analüüsist järeldub, et kõik proovid sisaldavad väga vähesel määral saastaineid. Kromatogrammil on nähtavad kergelt lenduvate (kuni C14 väljuvate) ühendite piigid, mis ei näita värskele kütustele iseloomuliku n-alkaanide jaotust, seega võib tegemist olla kas vana naftareostuse või bioloogilise päritoluga ühenditega.

Analüüsi käik:

Proovid ekstraheeriti veest pentaaniga.
Analüüsid teostati gaasikromatograafil VARIAN 3400 CX.
Gaasikromatograafilise analüüsi tingimused:
1. Kolonn: kvartskapillaar, pikkus 30 m, siseläbimõõt 0.32 mm.
2. Kolonni täidis: DB - 1 1,0 µ.
3. Kandegaas: N₂ 3.0 ml/min.
4. Suruõhk: 350 ml/min.
5. Vesinik: 35 ml/min.
6. Make-up gaas: N₂ 30 ml/min.
7. Detektor: FID, 300°C.
8. Aurusti: 220 °C.
9. Kolonni temperatuuriprogramm:

300 °C
/ (10.0 min.)
/ 15 °C/min
220 °C
/ (1.0 min.)
/ 25 °C/min
40 °C
(2,0 min.)

10. Võimendi tundlikkus: 10⁻¹² x 1
11. Proovi suurus: 1.0 µl

Analüüsi tulemus: PA 163 - 4,8 µg/l, PA 160 - 1,3 µg/l, PA 159 - 2,9 µg/l, Leivatsehh - 1,5 µg/l, PA 165 - 0.9 µg/l vee kohta.

Analüüsides tulemused säilitatakse Eesti Keskkonnauuringute Kesklaboris ühe aasta jooksul.

Proovide analüüsid teostas:
gaasikromatograafil

/ Tegevdirektor



K.Kuningas

E.Otsa

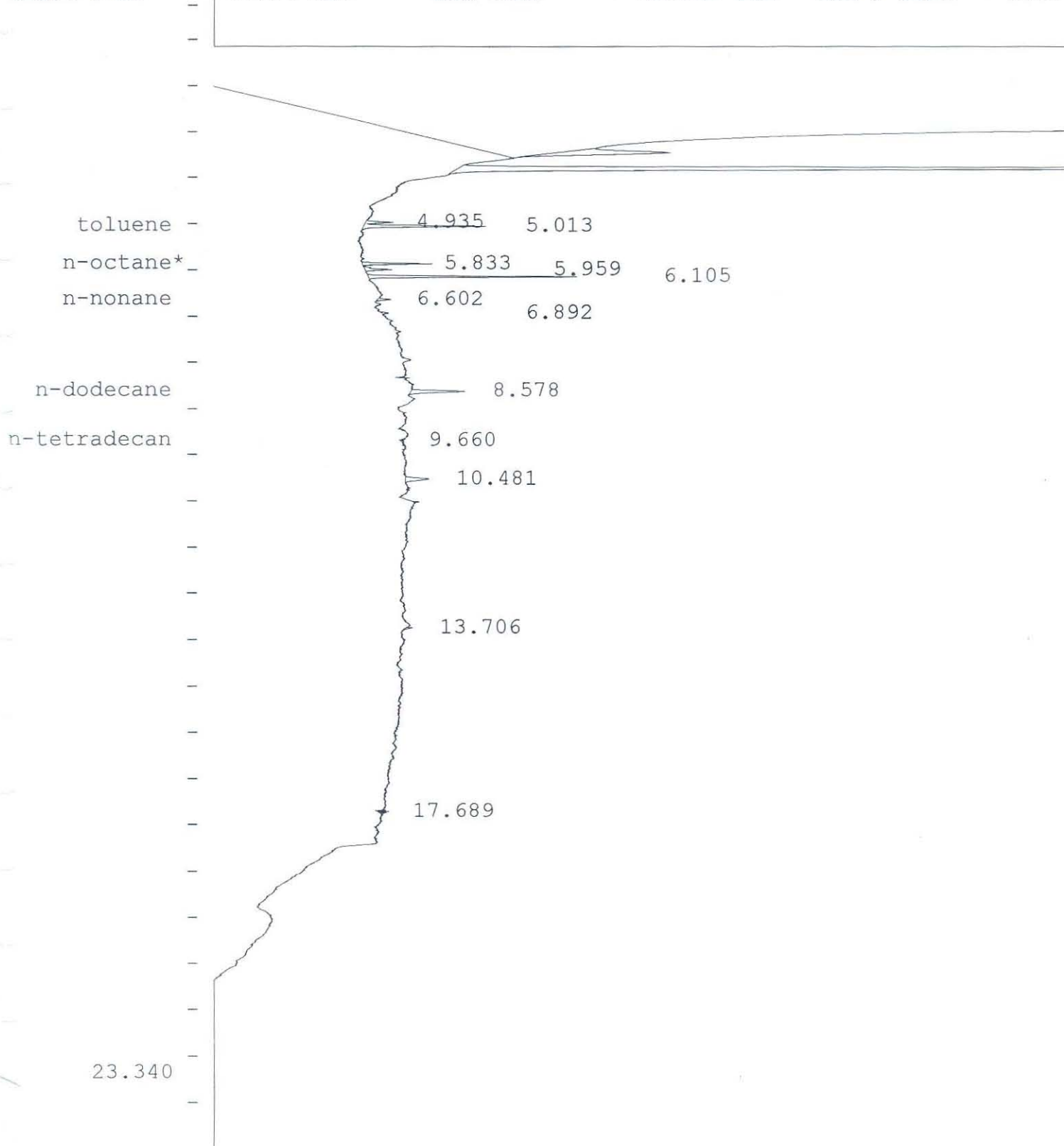
Title : naftareostus pöhjavees
Run File : C:\STAR\MODULE16\AVESI057.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi PA 159

Injection Date: 18-OCT-94 10:04 AM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants Detector Type: ADCB (1 Volt)
Workstation: Bus Address : 16
Instrument : A-VARIAN, Sample Rate : 10.00 Hz
Channel : A = A Run Time : 40.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Chart Speed = 0.87 cm/min Attenuation = 32 Zero Offset = -25%
Start Time = 0.000 min End Time = 25.000 min Min / Tick = 1.00



Title : naftareostus põhjavees
 Run File : C:\STAR\MODULE16\AVESI057.RUN
 Method File : C:\STAR\KAI-3.MTH
 Sample ID : Viimsi PA 159

Injection Date: 18-OCT-94 10:04 AM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants Detector Type: ADCB (1 Volt)
 Workstation: Bus Address : 16
 Instrument : A-VARIAN, Sample Rate : 10.00 Hz
 Channel : A = A Run Time : 40.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Run Mode : Analysis - Subtract Blank Baseline
 Peak Measurement: Peak Area
 Calculation Type: Percent

Peak No.	Peak Name	Result ()	Retention Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)
1		2.8153	4.935		551	BV	1.9
2	toluene	12.2948	5.013	-0.014	2407	VB	1.9
3	n-octane	6.4732	5.833	-0.011	1267	BP	1.8
4	p-xylene	3.1077	5.959	-0.002	609	PB	2.0
5	o-xylene	18.9357	6.105	-0.015	3708	BB	1.8
6	n-nonane	1.1697	6.602	-0.010	229	BB	1.6
7		0.5192	6.892		102	BB	2.1
8	n-dodecane	7.3433	8.578	0.063	1438	BB	2.6
9	n-tetradecan	0.4261	9.660	0.084	83	BB	0.0
10		4.1008	10.481		803	BB	3.5
11		0.4827	13.706		95	BB	1.3
12		0.4356	17.689		85	VV	0.8
13		0.4478	23.340		88	BB	0.9
14		39.7611	26.947		7785	BB	1.5
15		0.3094	27.839		61	BP	0.5
16		0.7580	27.897		148	PB	2.5
17		0.2783	30.330		54	BB	0.4
18		0.3414	37.942		67	BB	1.2
Totals:		100.0000		0.096	19580		

Total Unidentified Counts : 9839 counts

11377 - 3544

Detected Peaks: 24 Rejected Peaks: 6 Identified Peaks: 7

Amount Standard: 1.000000 Multiplier: 1.000000 Divisor: 1.000000

Baseline Offset: 3 microVolts

Noise (used): 34 microVolts - monitored before this run

2 µg

$$\Sigma \frac{7833 \cdot 109.2}{1502135 \cdot 100} = 5.7 \mu\text{g/l}$$

1 µg

2.7 µg/l

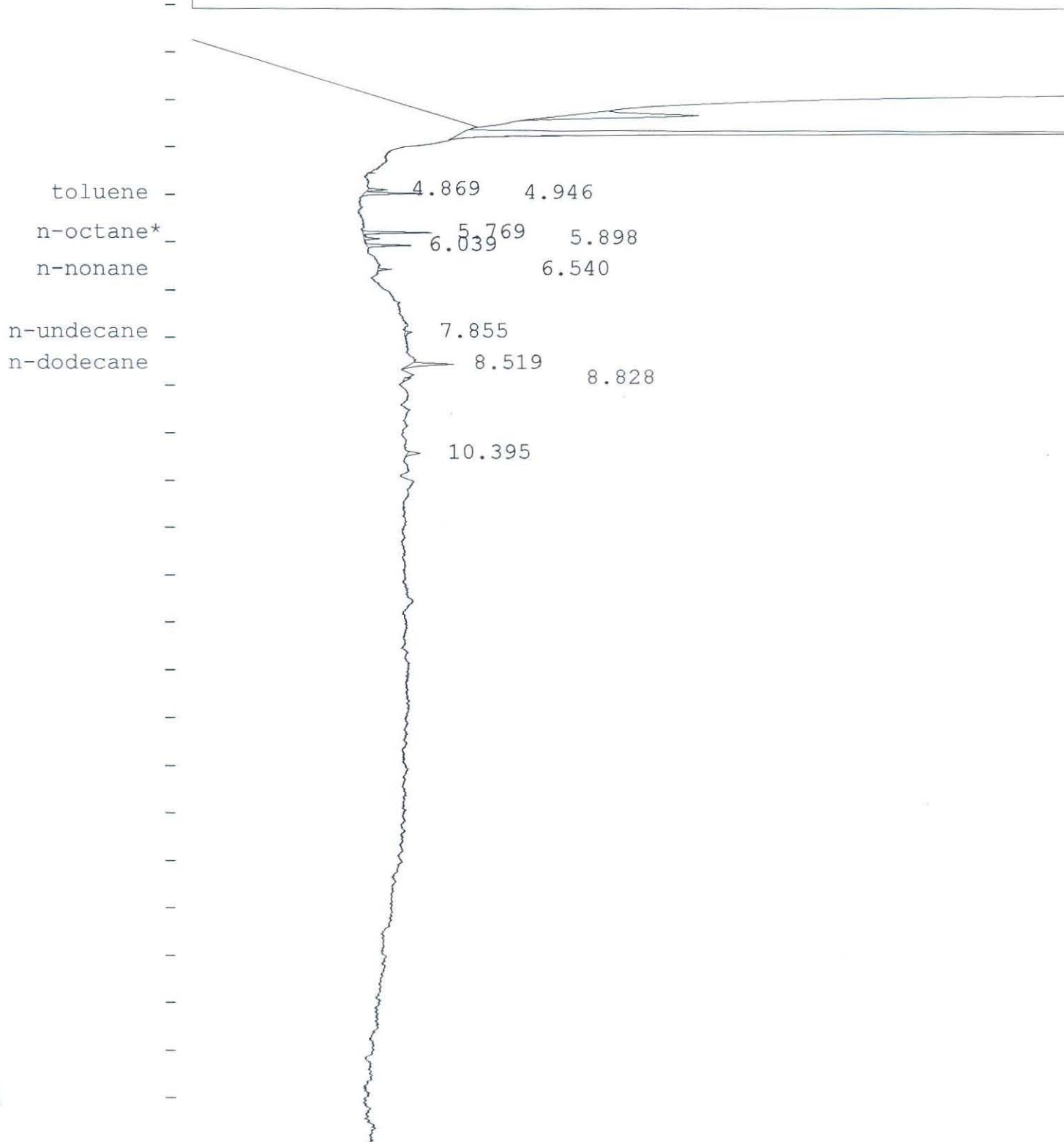
Title : naftareostus pöhjavees
Run File : C:\STAR\MODULE16\AVESI047.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi PA-165 2µl

Injection Date: 17-OCT-94 1:53 PM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants	Detector Type: ADCB (1 Volt)
Workstation:	Bus Address : 16
Instrument : A-VARIAN,	Sample Rate : 10.00 Hz
Channel : A = A	Run Time : 30.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Chart Speed =	0.87 cm/min	Attenuation =	32	Zero Offset =	-20%
Start Time =	0.000 min	End Time =	25.000 min	Min / Tick =	1.00



Title : naftareostus põhjavees
 Run File : C:\STAR\MODULE16\AVESI047.RUN
 Method File : C:\STAR\KAI-3.MTH
 Sample ID : Viimsi PA-165 2pl

Injection Date: 17-OCT-94 1:53 PM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants Detector Type: ADCB (1 Volt)
 Workstation: Bus Address : 16
 Instrument : A-VARIAN, Sample Rate : 10.00 Hz
 Channel : A = A Run Time : 30.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Run Mode : Analysis - Subtract Blank Baseline
 Peak Measurement: Peak Area
 Calculation Type: Percent

Peak No.	Peak Name	Result ()	Retention Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)
1		3.9240	4.869		330	BV	1.8
2	toluene	13.3925	4.946	-0.081	1125	VB	1.8
3	n-octane	14.9998	5.769	-0.075	1260	BV	1.9
4	ethylbenzene	3.4724	5.898	-0.028	292	VB	2.0
5	p-xylene	9.9680	6.039	0.078	837	BB	1.9
6	n-nonane	2.4667	6.540	-0.072	207	BB	1.5
7	n-undecane	2.2022	7.855	-0.079	185	BB	1.8
8	n-dodecane	14.6658	8.519	0.003	1232	BB	2.4
9		1.4261	8.828		120	VB	0.0
10		3.8047	10.395		320	BB	2.5
11		12.5254	25.734		1052	BB	0.0
12		0.6577	25.949		55	BV	0.0
13		5.5729	26.209		468	VB	0.0
14		6.6443	26.650		558	BV	0.0
15		3.5637	26.794		299	VB	0.0
16		0.7138	29.674		60	BB	1.5
Totals:		100.0000		-0.253	8399		

Total Unidentified Counts : 3262 counts

5907 - 3544

Detected Peaks: 20 Rejected Peaks: 4 Identified Peaks: 7

Amount Standard: 1.000000 Multiplier: 1.000000 Divisor: 1.000000

Baseline Offset: -10 microVolts

Noise (used): 31 microVolts - monitored before this run

9 µg/l

$$\Sigma \frac{2363.109, 7}{1502139 \cdot 100} = 1,7 \mu\text{g/l}$$

1 µg/l

0,9 µg/l

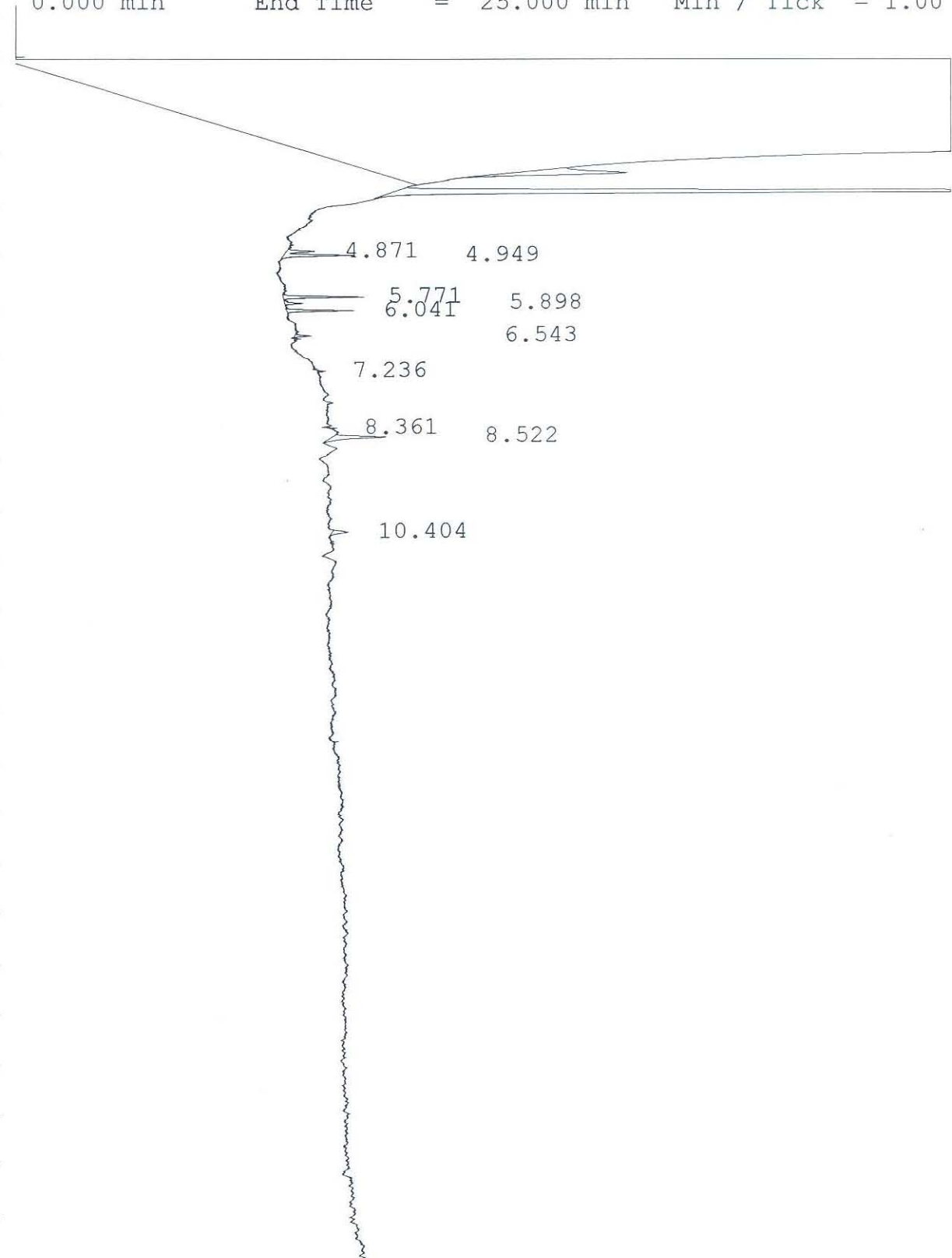
Title : naftareostus põhjavees
Run File : C:\STAR\MODULE16\AVESI045.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi PA-160 2µl

Injection Date: 17-OCT-94 1:07 PM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants Detector Type: ADCB (1 Volt)
Workstation: Bus Address : 16
Instrument : A-VARIAN, Sample Rate : 10.00 Hz
Channel : A = A Run Time : 30.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Chart Speed = 0.87 cm/min Attenuation = 32 Zero Offset = -10%
Start Time = 0.000 min End Time = 25.000 min Min / Tick = 1.00



toluene - 4.871 4.949
n-octane* - 5.771 5.898
n-nonane - 6.041 6.543
n-decane - 7.236
n-dodecane - 8.361 8.522
10.404

Title : naftareostus põhjavees
Run File : C:\STAR\MODULE16\AVESI045.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi PA-160 2µl

Injection Date: 17-OCT-94 1:07 PM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants Detector Type: ADCB (1 Volt)
Workstation: Bus Address : 16
Instrument : A-VARIAN, Sample Rate : 10.00 Hz
Channel : A = A Run Time : 30.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Run Mode : Analysis - Subtract Blank Baseline
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Retention Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)
1		4.3466	4.871		567	BV	2.1
2	toluene	10.0946	4.949	-0.078	1318	VB	1.8
3	n-octane	10.7050	5.771	-0.073	1398	BP	1.9
4	ethylbenzene	2.6342	5.898	-0.028	344	PB	2.0
5	o-xylene	8.3930	6.041	-0.079	1096	BB	1.8
6	n-nonane	1.7408	6.543	-0.069	227	BP	1.6
7	n-decane	0.4891	7.236	-0.067	64	BB	0.9
8		0.6593	8.361		86	BB	1.1
9	n-dodecane	11.7396	8.522	0.007	1533	BB	2.7
10		3.1013	10.404		405	BB	2.8
11		4.8859	25.396		638	BP	0.0
12		16.9890	26.095		2218	PV	0.0
13		12.1753	26.434		1590	VB	0.0
14		1.3921	26.654		182	BV	0.0
15		0.7458	26.689		97	VV	0.0
16		1.0644	26.755		139	VP	0.0
17		0.7918	26.771		103	PV	0.0
18		1.0082	26.814		132	VV	0.0
19		0.7128	27.916		93	BB	0.0
20		1.5612	28.070		204	BV	0.0
21		0.4849	28.176		63	BV	0.0
22		0.4323	28.194		56	VV	0.0
23		0.4312	28.214		56	VB	0.0
24		1.4117	28.897		184	BB	0.0
25		0.6990	29.054		91	BB	2.0
26		1.3109	29.734		171	BB	0.0
Totals:		100.0000		-0.388	13056		

Total Unidentified Counts : 7077 counts $\Sigma 7039$
Detected Peaks: 37 Rejected Peaks: 11 Identified Peaks: 7
Amount Standard: 1.000000 Multiplier: 1.000000 Divisor: 1.000000
Baseline Offset: -3 microVolts
Noise (used): 33 microVolts - monitored before this run

$$\frac{3495 \cdot 10.72}{1502133 \cdot 100} = 2.6 \mu\text{g/l}$$

$$1.3 \mu\text{g/l}$$

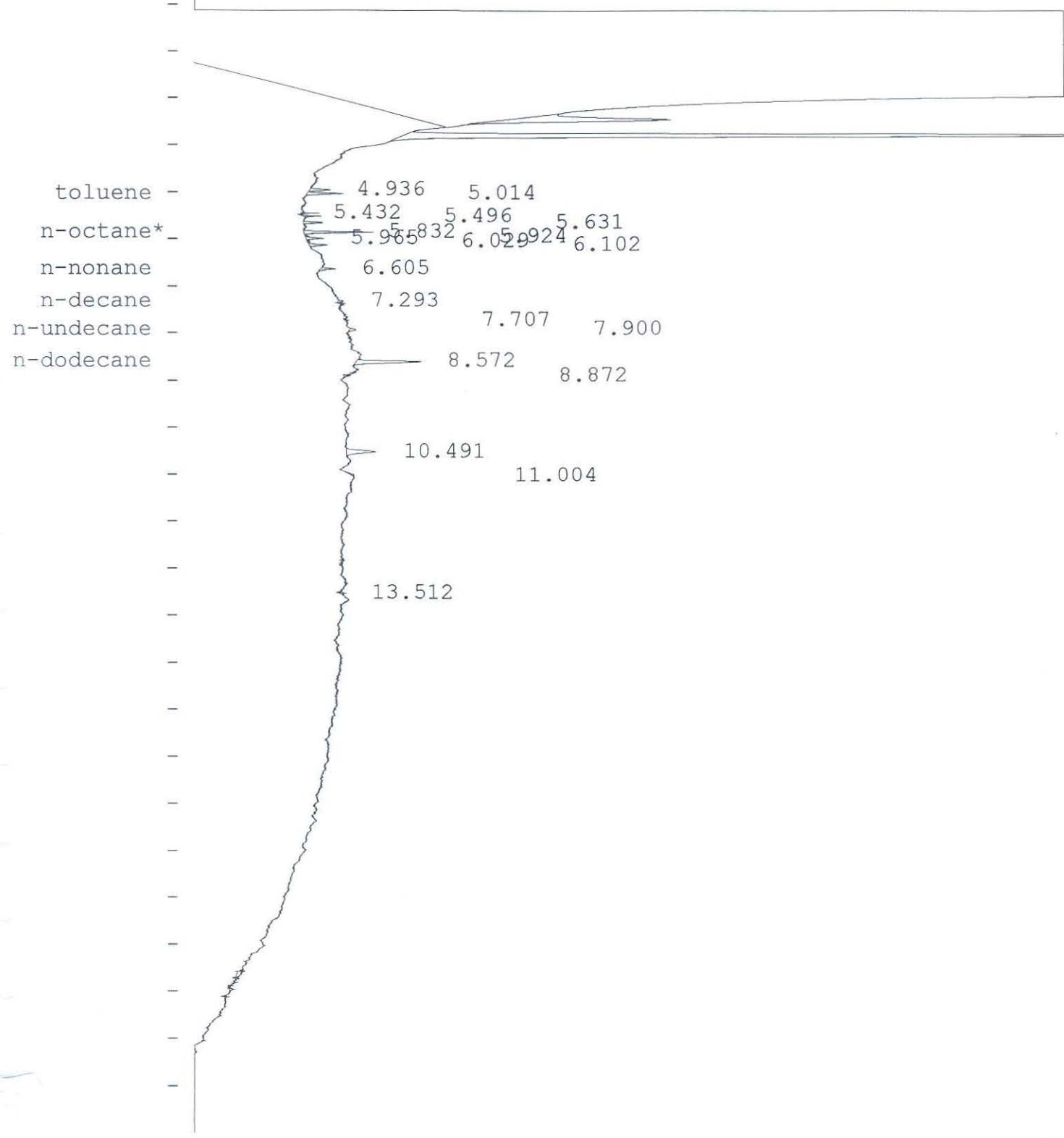
Title : naftareostus pöhjavees
Run File : C:\STAR\MODULE16\AVESI058.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi leivatsehh2u

Injection Date: 18-OCT-94 11:00 AM Recalculation Date: 19-OCT-94 11:03 AM

Operator : Ants	Detector Type: ADCB (1 Volt)
Workstation:	Bus Address : 16
Instrument : A-VARIAN,	Sample Rate : 10.00 Hz
Channel : A = A	Run Time : 33.998 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Chart Speed = 0.87 cm/min	Attenuation = 32	Zero Offset = -30%
Start Time = 0.000 min	End Time = 25.000 min	Min / Tick = 1.00



Title : naftareostus põhjavees
Run File : C:\STAR\MODULE16\AVESI058.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi leivatsehh2μ

Injection Date: 18-OCT-94 11:00 AM Recalculation Date: 19-OCT-94 11:03 AM

Operator : Ants Detector Type: ADCB (1 Volt)
Workstation: Bus Address : 16
Instrument : A-VARIAN, Sample Rate : 10.00 Hz
Channel : A = A Run Time : 33.998 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Run Mode : Analysis - Subtract Blank Baseline
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Retention Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)
1		1.9724	4.936		402	BV	2.0
2	toluene	3.0367	5.014	-0.013	619	VB	1.7
3		0.2619	5.432		53	BB	0.2
4		1.0799	5.496		220	BB	1.3
5		1.6332	5.631		333	BB	2.0
6	n-octane	6.2119	5.832	-0.011	1266	BP	1.9
7	ethylbenzene	0.2752	5.924	-0.002	56	PV	0.0
8	p-xylene	1.3431	5.965	0.004	274	VV	1.9
9		0.3338	6.029		68	VP	0.0
10	o-xylene	1.8239	6.102	-0.018	372	PB	2.5
11	n-nonane	1.2351	6.605	-0.007	252	BB	1.5
12	n-decane	0.4234	7.293	-0.010	86	BB	1.2
13		0.3017	7.707		61	VB	0.0
14	n-undecane	0.6754	7.900	-0.034	138	BB	2.5
15	n-dodecane	9.3227	8.572	0.057	1899	BB	3.1
16		0.4965	8.872		101	BB	2.1
17		5.1287	10.491		1045	BB	3.7
18		0.6000	11.004		122	BB	0.0
19		0.4741	13.512		97	BB	0.0
20		63.3705	32.500		12911	GR	0.0
Totals:		100.0000		-0.034	20374		

Total Unidentified Counts : 15414 counts

Σ 7463

Detected Peaks: 131

Rejected Peaks: 5

Identified Peaks: 9

Amount Standard: 1.000000

Multiplier: 1.000000

Divisor: 1.000000

Baseline Offset: 11 microVolts

Noise (used): 24 microVolts - monitored before this run

$$\Sigma \frac{3515 \cdot 109,2}{1502133 \cdot 100} = 2,9 \mu\text{g/l} \quad / \quad 4,5 \mu\text{g/l}$$

Title : naftareostus pöhjavees
Run File : C:\STAR\MODULE16\CLAH021.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi PA-163

Injection Date: 17-OCT-94 12:24 PM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants Detector Type: ADCB (1 Volt)
Workstation: Bus Address : 16
Instrument : A-VARIAN, Sample Rate : 10.00 Hz
Channel : A = Run Time : 25.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Chart Speed = 0.87 cm/min Attenuation = 32 Zero Offset = -15%
Start Time = 0.000 min End Time = 25.000 min Min / Tick = 1.00

toluene - 4.869 4.944
n-octane* - 5.578 5.767 5.887
n-nonane - 6.036 6.165 6.390
n-decane - 6.536 6.644 6.914
n-undecane - 7.305 7.366 7.691
n-dodecane - 7.854 7.953 8.438

10.399

20.947

21.420

Title : naftareostus põhjavees
Run File : C:\STAR\MODULE16\CLAH021.RUN
Method File : C:\STAR\KAI-3.MTH
Sample ID : Viimsi PA-163

Injection Date: 17-OCT-94 12:24 PM Recalculation Date: 19-OCT-94 10:41 AM

Operator : Ants Detector Type: ADCB (1 Volt)
Workstation: Bus Address : 16
Instrument : A-VARIAN, Sample Rate : 10.00 Hz
Channel : A = Run Time : 25.002 min

***** Star Chromatography Workstation ***** Version 3.0 *****

Run Mode : Analysis - Subtract Blank Baseline
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Retention Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)
1		3.4787	4.869		587	BV	2.5
2	toluene	3.1617	4.944	-0.083	533	VB	1.8
3		7.1982	5.578		1215	BP	6.0
4	n-octane	6.9500	5.767	-0.077	1173	PV	1.9
5	ethylbenzene	5.6158	5.887	-0.039	948	VP	3.8
6	p-xylene	1.7554	6.036	0.075	296	PB	2.3
7	o-xylene	0.9134	6.165	0.045	154	BP	2.0
8		9.8794	6.390		1667	PV	6.8
9		7.2355	6.536		1221	VV	1.9
10	n-nonane	5.6886	6.644	0.032	960	VP	3.1
11		0.9671	6.753		163	PP	1.4
12		2.1748	6.823		367	PV	2.0
13		3.3680	6.914		568	VV	0.0
14		3.3032	6.993		557	VV	0.0
15		3.0401	7.049		513	VV	0.0
16		4.2481	7.113		717	VV	0.0
17		3.5943	7.227		606	VV	3.6
18	n-decane	1.0448	7.305	0.002	176	VV	0.0
19		0.7579	7.366		128	VB	0.0
20		3.4419	7.691		581	BP	4.6
21		3.5302	7.854		596	PV	1.9
22	n-undecane	0.5426	7.953	0.019	92	VB	0.0
23		2.1580	8.298		364	BV	2.2
24		2.3849	8.438		402	VV	0.0
25	n-dodecane	8.5697	8.518	0.003	1446	VB	2.6
26		2.9229	10.399		493	BB	3.8
27		0.3214	20.947		54	BB	0.0
28		1.7534	21.420		296	BP	0.0
---	Totals:	100.0000		-0.023	16872		

Total Unidentified Counts : 11095 counts

Detected Peaks: 30 Rejected Peaks: 2 Identified Peaks: 9

Amount Standard: 1.000000 Multiplier: 1.000000 Divisor: 1.000000

Baseline Offset: -5 microVolts

Noise (used): 34 microVolts - monitored before this run

$$\Sigma \frac{1352P \cdot 107.2}{1102135 \cdot 100} = 9.7 \mu g/l \quad / \quad 48 \mu g/l$$

*11. peak can for
(- 3104)*

NAFTAPRODUKTIDE IDENTIFITSEERIMINE.

Meie kiri Nr.2-2/1590-1594 15.12.94.a.
Teie kiri Nr. 13.12.94.a.

Analüüsitava objekt: Veeproovid Viimsi kütuselaost
Proovi nr. ja proovivõtmise koht: PA 163 -Haabneeme keskus , pumbajaam nr.2, PA 160 - Haabneeme keskus , pumbajaam nr.5, PA 159 Miiduranna tehas , PA - leivatsehh, PA 165 - Viimsi kütuseladu.
Proovi võtja (asutus, amet, nimi) : AS "MAVES" , geoloog A.Krapiva.
Proovivõtmise kuupäev: 13.12.94.a. kell .
Laborisse sisse tulnud : 13.12.94.a. kell 13.30
Analüüs alustatud : 13.12.94. a. lõpetatud : 15.12.94.a.

Analüüsi tulemus:

Gaasikromatograafilisest analüüsist järeldub, et proovides sisalduvate saastainete hulk on alla 3 µg / l. Kromatogrammil nähtavate ühendite piigid võivad olla bioloogilise päritoluga .

Analüüsi käik:

Proovid ekstraheeriti veest pentaaniga.

Analüüsid teostati gaasikromatograafil VARIAN 3400 CX .

Gaasikromatograafilise analüüsi tingimused:

1. Kolonn: kvartskapillaar, pikkus 50 m , siseläbimõõt 0.25mm.
2. Kolonni täidis: OV - 101 1,0 µ.
3. Kandegaas: N₂ 2.0 ml/min .
4. Suruõhk: 350 ml / min.
5. Vesinik : 35 ml /min .
6. Make -up gaas : N₂ 30 ml/ min
7. Detektor: FID , 300°C.
8. Aurusti: 220 °C.
9. Kolonni temperatuuriprogramm:

_____ 300 °C _____
/ (10.0min.)
/ 10 °C/min

_____ 220 °C _____/
/ (1.0 min.)
/ 25 °C/ min

_____ 40 °C _____/
(2,0 min.)

10. Võimendi tundlikkus: 10⁻¹² x 1
11. Proovi suurus: 1.0 µl

Analüüsides tulemused säilitatakse Eesti Keskkonnauuringute Kesklaboris ühe aasta jooksul.

Proovide analüüsid teostas:
gaasikromatograafil

Tegevdirektor



K.Kuningas



E.Otsa

Title : Tihareostusnaftareostus
Run File : C:\STAR\MODULE16\YAVA020.RUN
Method File : C:\STAR\KAI4.MTH
Sample ID : ~~Basel~~; ViimsiPA-163

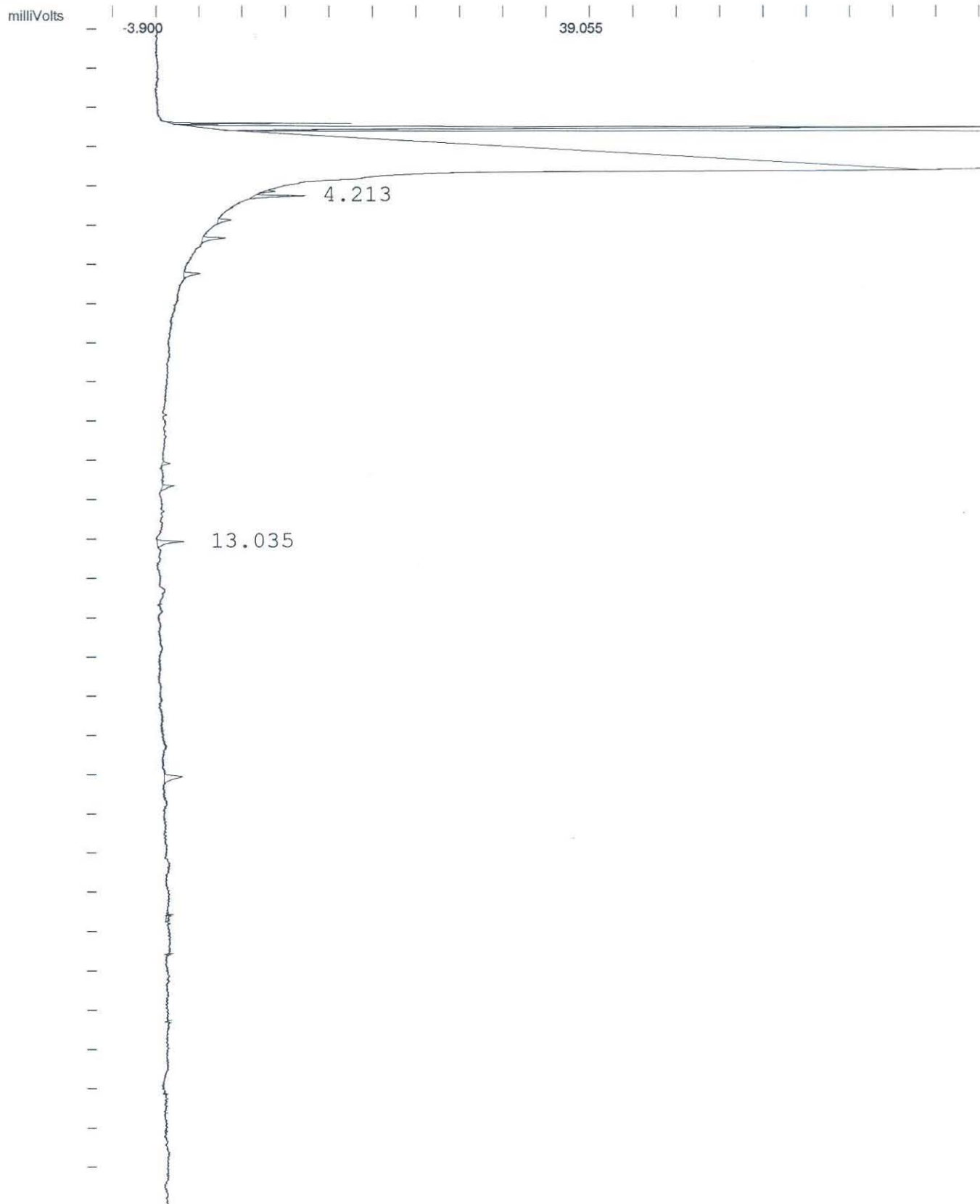
Haabneeme keskus, pumbajaam N2

Injection Date: 14-DEC-94 10:44 AM Calculation Date: 15-DEC-94 9:24 AM

Operator : Ants Detector Type: ADCB (10 Volts)
Workstation: Bus Address : 16
Instrument : A-Yanaco B- Varian Sample Rate : 10.00 Hz
Channel : B = FID Run Time : 30.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 0.72 cm/min Attenuation = 32 Zero Offset = 5%
Start Time = 0.000 min End Time = 30.000 min Min / Tick = 1.00



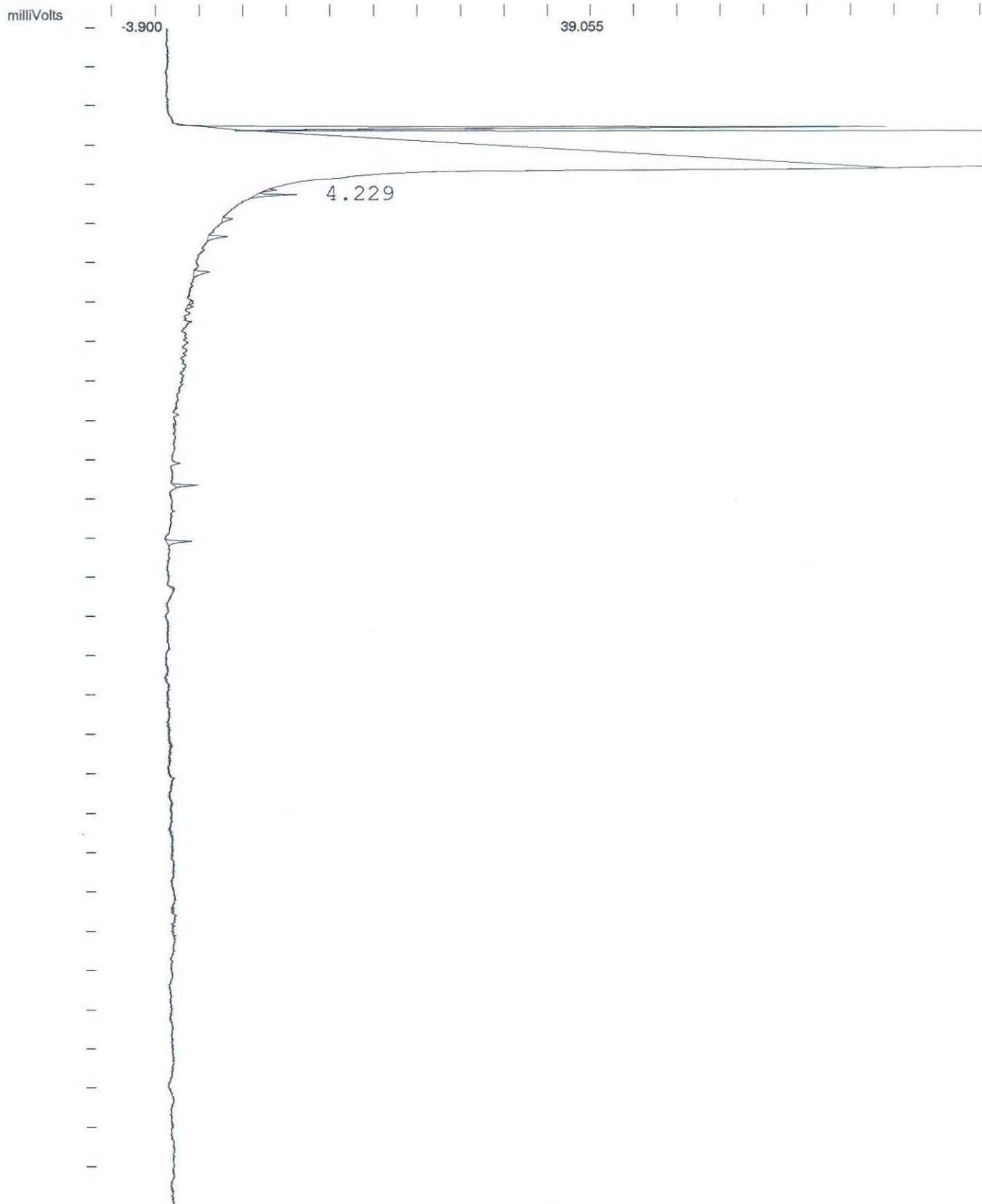
Title Tiha@tareostusnaftareostus
Run File : C:\STAR\MODULE16\YAVA021.RUN
Method File : C:\STAR\KAI4.MTH
Sample ID : e146#Viimsi PA160 *Haabneeme keskus, Pumbajaam NS*

Injection Date: 14-DEC-94 11:38 AM Calculation Date: 15-DEC-94 9:24 AM

Operator : Ants Detector Type: ADCB (10 Volts)
Workstation: Bus Address : 16
Instrument : A-Yanaco B- Varian Sample Rate : 10.00 Hz
Channel : B = FID Run Time : 30.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 0.72 cm/min Attenuation = 32 Zero Offset = 5%
Start Time = 0.000 min End Time = 30.000 min Min / Tick = 1.00



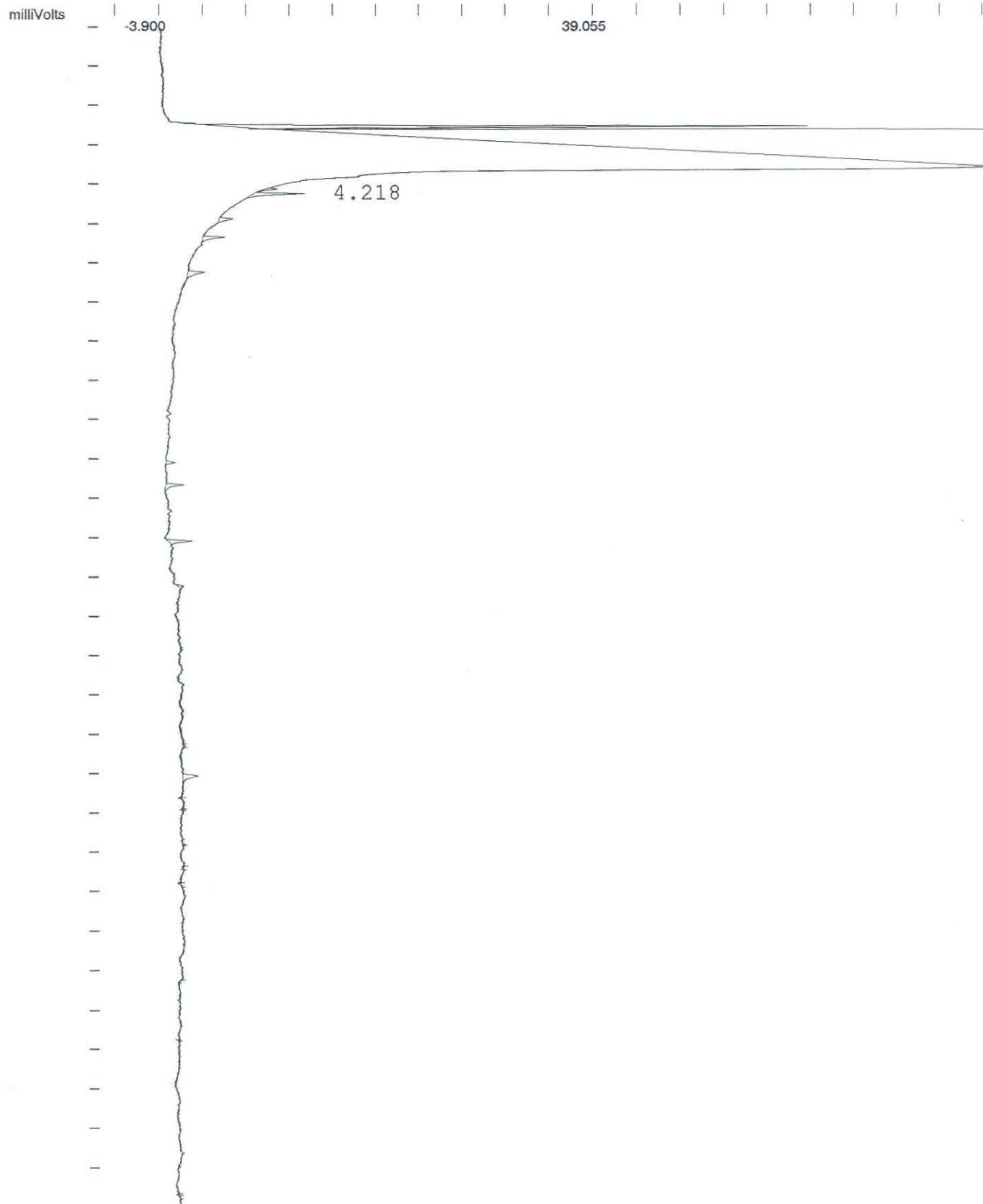
Title Title: areostusnaftareostus
Run File : C:\STAR\MODULE16\YAVA022.RUN
Method File : C:\STAR\KAI4.MTH
Sample ID : ~~base~~*Viimsi PA159 *Miduranna tehas*

Injection Date: 14-DEC-94 12:37 PM Calculation Date: 15-DEC-94 9:23 AM

Operator : Ants Detector Type: ADCB (10 Volts)
Workstation: Bus Address : 16
Instrument : A-Yanaco B- Varian Sample Rate : 10.00 Hz
Channel : B = FID Run Time : 30.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 0.72 cm/min Attenuation = 32 Zero Offset = 5%
Start Time = 0.000 min End Time = 30.000 min Min / Tick = 1.00



Title Tinãftareostusnaftareostus

Run File : C:\STAR\MODULE16\YAVA024.RUN

Method File : C:\STAR\KAI4.MTH

Sample ID : Viimsi PA-165 ~~Leiva~~ Kütusklaudu

Injection Date: 14-DEC-94 2:23 PM

Calculation Date: 15-DEC-94 9:23 AM

Operator : Ants

Detector Type: ADCB (10 Volts)

Workstation:

Bus Address	: 16
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Instrument : A-Yanaco B- Varian

Sample Rate : 10.00 Hz

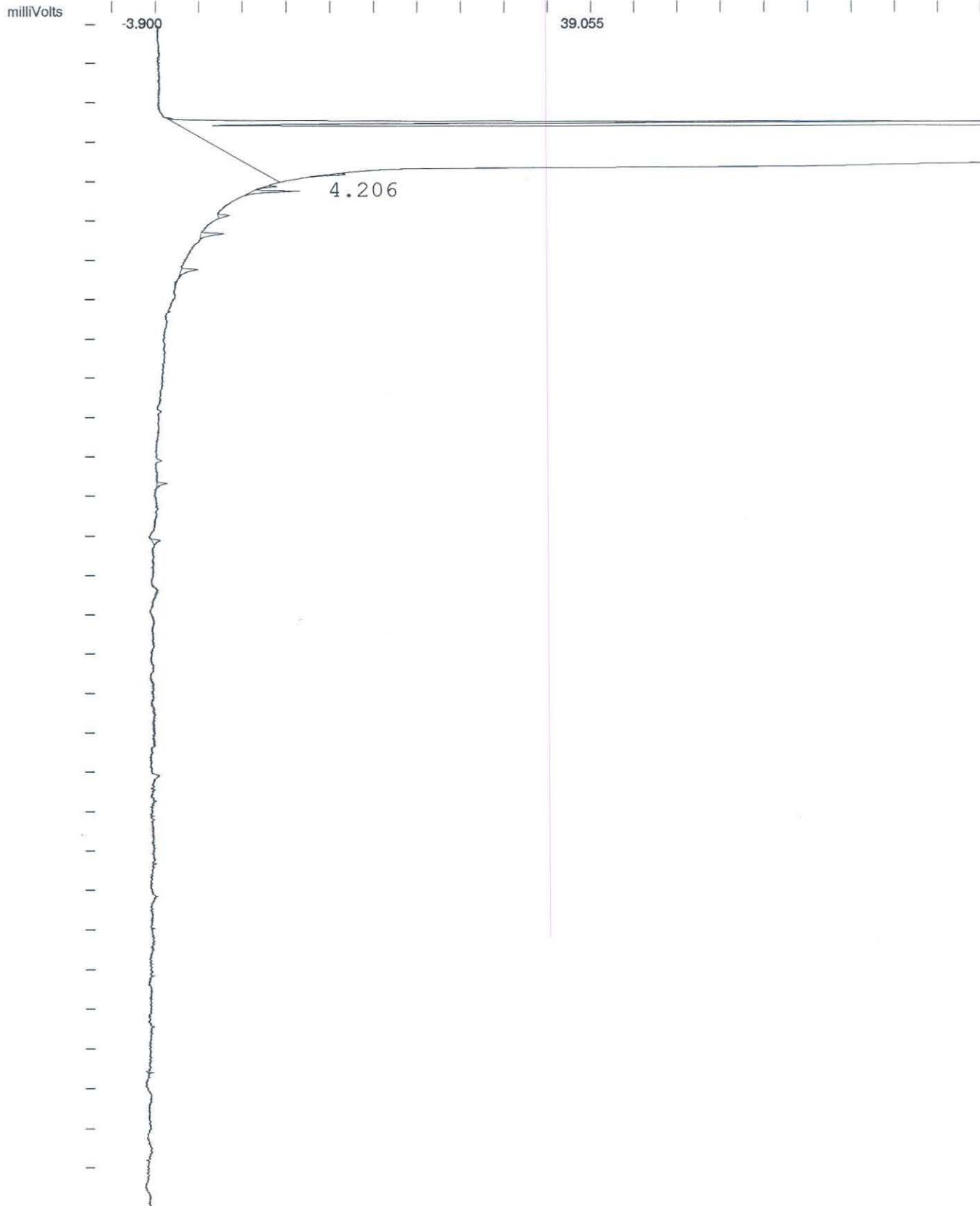
Channel : B = FID

Run Time : 30.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 0.72 cm/min Attenuation = 32 Zero Offset = 5%

Start Time = 0.000 min End Time = 30.000 min Min / Tick = 1.00



Title : rinaetareostusnaftareostus
Run File : C:\STAR\MODULE16\YAVA025.RUN
Method File : C:\STAR\KAI4.MTH
Sample ID : ~~base1;Viimsi~~ ~~27-165~~ Leivatsehh

Injection Date: 14-DEC-94 3:06 PM Calculation Date: 15-DEC-94 9:23 AM

Operator : Ants Detector Type: ADCB (10 Volts)
Workstation: Bus Address : 16
Instrument : A-Yanaco B- Varian Sample Rate : 10.00 Hz
Channel : B = FID Run Time : 25.413 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 0.85 cm/min Attenuation = 32 Zero Offset = 5%
Start Time = 0.000 min End Time = 25.413 min Min / Tick = 1.00

