



# EPSE



- Lyhyesti
- Miksi EPSE
- Vientiin
- Kokemuksia

**EPSE Oy**

[www.epse.fi/en](http://www.epse.fi/en)

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# Behind the innovation

## The Origins of the EPSE™ Method

The inventor of the EPSE™ Method, **Vesa Rissanen**, owned a pickling plant years ago, where airplane parts were hard chrome plated. In the process, numerous metals dissolve in the acid, eventually forming acidic hazardous waste.

*Turning Waste into Wealth:*  
**From Innovation to Economical Solution**



**Vesa Rissanen**

Innovator of the EPSE™ Method, Co-founder

# Metals tested for the EPSE™ Method

**Tested metals**  
 EPSE™ Method has been tested for **51 metals**.

**Periodic Table of the Elements**

1 IA 1A																	18 VIII 8A
1 <b>H</b> Hydrogen 1.008	2 IIA 2A											13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	2 <b>He</b> Helium 4.003
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.012											5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.007	8 <b>O</b> Oxygen 15.999	9 <b>F</b> Fluorine 18.998	10 <b>Ne</b> Neon 20.180
11 <b>Na</b> Sodium 22.990	12 <b>Mg</b> Magnesium 24.305	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8 VIII 8	9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	13 <b>Al</b> Aluminum 26.982	14 <b>Si</b> Silicon 28.086	15 <b>P</b> Phosphorus 30.974	16 <b>S</b> Sulfur 32.066	17 <b>Cl</b> Chlorine 35.453	18 <b>Ar</b> Argon 39.948
19 <b>K</b> Potassium 39.098	20 <b>Ca</b> Calcium 40.078	21 <b>Sc</b> Scandium 44.956	22 <b>Ti</b> Titanium 47.867	23 <b>V</b> Vanadium 50.942	24 <b>Cr</b> Chromium 51.996	25 <b>Mn</b> Manganese 54.938	26 <b>Fe</b> Iron 55.845	27 <b>Co</b> Cobalt 58.933	28 <b>Ni</b> Nickel 58.693	29 <b>Cu</b> Copper 63.546	30 <b>Zn</b> Zinc 65.38	31 <b>Ga</b> Gallium 69.723	32 <b>Ge</b> Germanium 72.631	33 <b>As</b> Arsenic 74.922	34 <b>Se</b> Selenium 78.971	35 <b>Br</b> Bromine 79.904	36 <b>Kr</b> Krypton 83.798
37 <b>Rb</b> Rubidium 85.468	38 <b>Sr</b> Strontium 87.62	39 <b>Y</b> Yttrium 88.906	40 <b>Zr</b> Zirconium 91.224	41 <b>Nb</b> Niobium 92.906	42 <b>Mo</b> Molybdenum 95.95	43 <b>Tc</b> Technetium 98.907	44 <b>Ru</b> Ruthenium 101.07	45 <b>Rh</b> Rhodium 102.906	46 <b>Pd</b> Palladium 106.42	47 <b>Ag</b> Silver 107.868	48 <b>Cd</b> Cadmium 112.414	49 <b>In</b> Indium 114.818	50 <b>Sn</b> Tin 118.711	51 <b>Sb</b> Antimony 121.760	52 <b>Te</b> Tellurium 127.6	53 <b>I</b> Iodine 126.904	54 <b>Xe</b> Xenon 131.294
55 <b>Cs</b> Cesium 132.905	56 <b>Ba</b> Barium 137.328	57-71	72 <b>Hf</b> Hafnium 178.49	73 <b>Ta</b> Tantalum 180.948	74 <b>W</b> Tungsten 183.84	75 <b>Re</b> Rhenium 186.207	76 <b>Os</b> Osmium 190.23	77 <b>Ir</b> Iridium 192.217	78 <b>Pt</b> Platinum 195.085	79 <b>Au</b> Gold 196.967	80 <b>Hg</b> Mercury 200.592	81 <b>Tl</b> Thallium 204.383	82 <b>Pb</b> Lead 207.2	83 <b>Bi</b> Bismuth 208.980	84 <b>Po</b> Polonium [208.982]	85 <b>At</b> Astatine 209.987	86 <b>Rn</b> Radon 222.018
87 <b>Fr</b> Francium 223.020	88 <b>Ra</b> Radium 226.025	89-103	104 <b>Rf</b> Rutherfordium [261]	105 <b>Db</b> Dubnium [262]	106 <b>Sg</b> Seaborgium [266]	107 <b>Bh</b> Bohrium [264]	108 <b>Hs</b> Hassium [269]	109 <b>Mt</b> Meitnerium [278]	110 <b>Ds</b> Darmstadtium [281]	111 <b>Rg</b> Roentgenium [280]	112 <b>Cn</b> Copernicium [285]	113 <b>Nh</b> Nihonium [286]	114 <b>Fl</b> Flerovium [289]	115 <b>Mc</b> Moscovium [289]	116 <b>Lv</b> Livermorium [293]	117 <b>Ts</b> Tennessine [294]	118 <b>Og</b> Oganesson [294]
Lanthanide Series		57 <b>La</b> Lanthanum 138.905	58 <b>Ce</b> Cerium 140.116	59 <b>Pr</b> Praseodymium 140.908	60 <b>Nd</b> Neodymium 144.243	61 <b>Pm</b> Promethium 144.913	62 <b>Sm</b> Samarium 150.36	63 <b>Eu</b> Europium 151.964	64 <b>Gd</b> Gadolinium 157.25	65 <b>Tb</b> Terbium 158.925	66 <b>Dy</b> Dysprosium 162.500	67 <b>Ho</b> Holmium 164.930	68 <b>Er</b> Erbium 167.259	69 <b>Tm</b> Thulium 168.934	70 <b>Yb</b> Ytterbium 173.055	71 <b>Lu</b> Lutetium 174.967	
Actinide Series		89 <b>Ac</b> Actinium 227.028	90 <b>Th</b> Thorium 232.038	91 <b>Pa</b> Protactinium 231.036	92 <b>U</b> Uranium 238.029	93 <b>Np</b> Neptunium 237.048	94 <b>Pu</b> Plutonium 244.064	95 <b>Am</b> Americium 243.061	96 <b>Cm</b> Curium 247.070	97 <b>Bk</b> Berkelium 247.070	98 <b>Cf</b> Californium 251.080	99 <b>Es</b> Einsteinium [254]	100 <b>Fm</b> Fermium 257.095	101 <b>Md</b> Mendelevium 258.1	102 <b>No</b> Nobelium 259.101	103 <b>Lr</b> Lawrencium [262]	



# Kuinka menetelmä toimii

Element	Untreated water (mg/l)*
Chromium (Cr)	1800
Chromium (Cr 6+)	49
Copper (Cu)	11000
Lead (Pb)	12
Nickel (Ni)	7000
Iron (Fe)	9800
Zinc (Zn)	3900
Tin (Sn)	3900
<b>Total</b>	<b>37452</b>

~ 100% metal removal

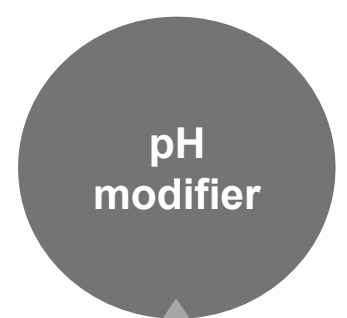
\* Results from EPSE Lab PoC test work for industrial waste handler's combined wastewaters.

Element	EPSE-treated water (mg/l)*
Chromium (Cr)	0,058
Chromium (Cr 6+)	0,058
Copper (Cu)	0,36
Lead (Pb)	0,001
Nickel (Ni)	0,26
Iron (Fe)	1,6
Zinc (Zn)	0,012
Tin (Sn)	0,087
<b>Total</b>	<b>2,44</b>

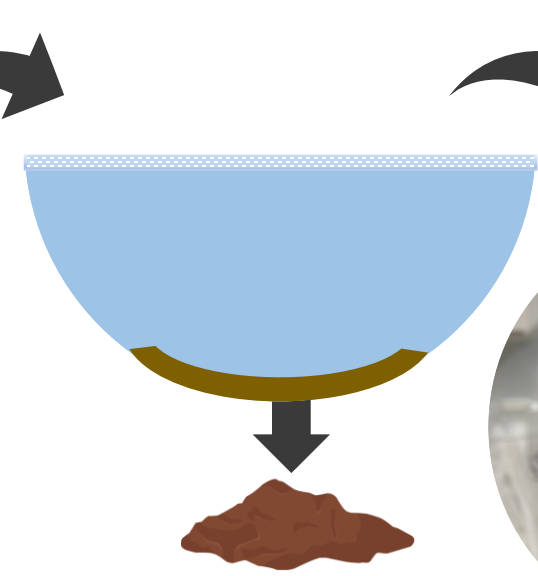
 Hazardous waste containing soluble metals



pH ~ 3,5



pH ~ 10,0

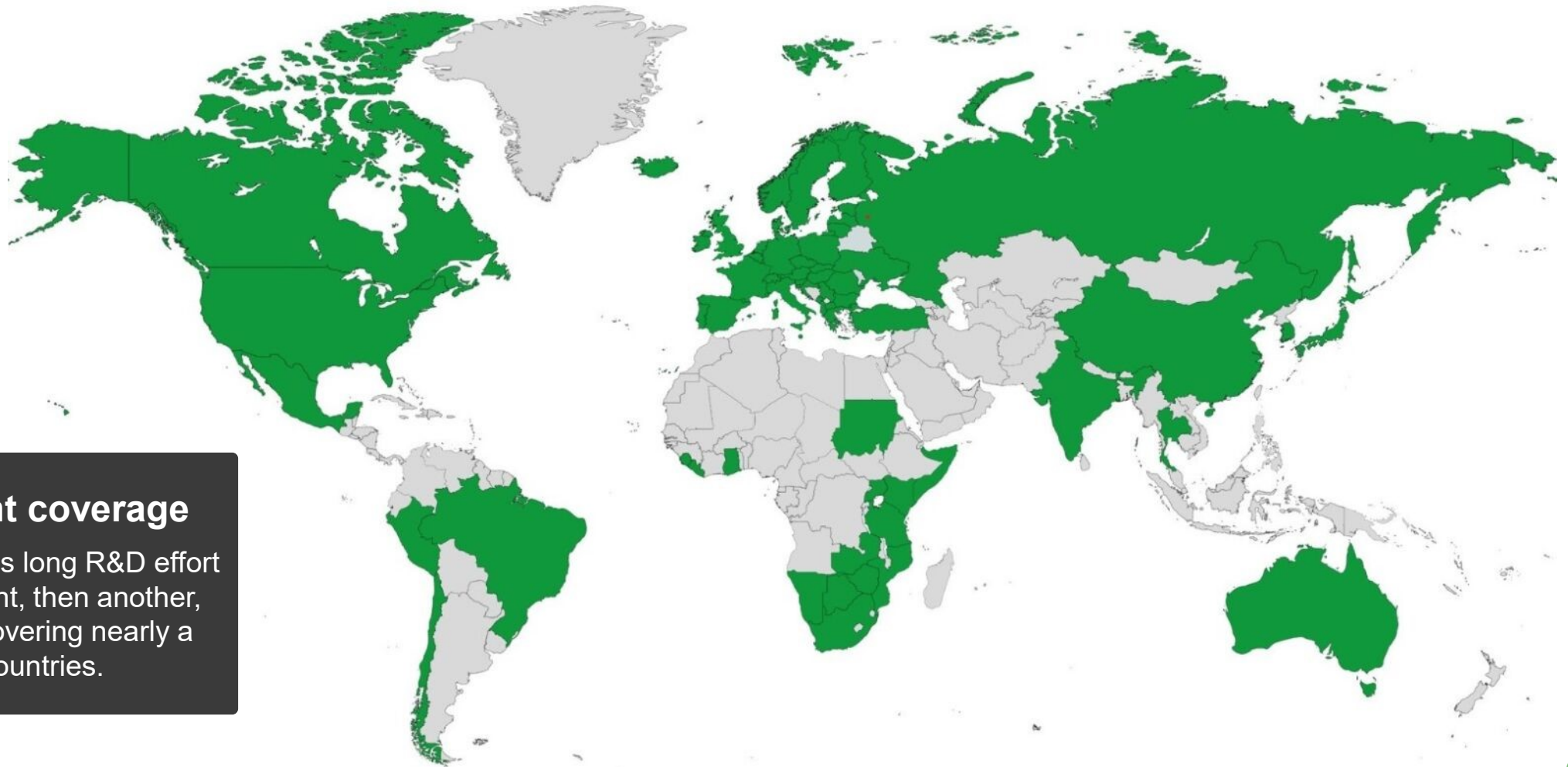


**EPSE precipitate (Metals)**

 Treated water



# Global patent coverage



## Global patent coverage

The result of EPSE's long R&D effort was first one patent, then another, and finally five, covering nearly a hundred countries.

# Miksi EPSE™ Menetelmä



Mining Industry



Metal Industry



Industrial Parks



Others

**Ilmasto-  
muutos**

**Vesi**

**Metalleja**

**ESG >>  
Rahoitus**



# EPSE

- Patent rights
- Lab & Recipe & Technical support
- EPSE™ chemical / Production & Sales



License agreement

JV

## Regional partner

- Owner 1
- Owner 2
- Owner n



Sales & Marketing



B2B Service



On-site piloting



EULA

### Customers

Mining

Industry

Industry parks

Others



# Kokemuksia

- Hakeminen / konsultit
- Ajantarve : omaväli mukana
- Huolellisuus
- Hylkäys >>> Uudelleen >> Uudelleen
- Tiliöinti ja kirjanpito
- Tilintarkastus
- Hankintojen kilpailutus
- Työajanseuranta \_ työtunnit
  
- Pikkusen enemmän ensin ja paljon vähemmän jälkeenpäin





# Our partners and collaborators



# Working for **better industry**



**Environment**



**People**



**Solutions**



**Entrepreneurship**



**Meaning, that**

- We respect and value the environment and nature
- Our workers and our associates are our assets
- Our innovation is our advantage, and we promote all parties' operational profitability
- Entrepreneurship is a way of life for us

**Read more:** [www.epse.fi/en/responsibility/](http://www.epse.fi/en/responsibility/)

# Thank you!



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