

Senior Expert Environmental management with minerals and geochemical technology:

Company:	GeoChemTec
Family name:	Zijlstra
First names:	Johannes (Hans) Jozefus Petrus
Nationality:	Dutch
Residence:	Netherlands
Civil status:	Married to Hedia Bessaies

Education:

Institute Earth Sciences – Utrecht University 1986 - 1994	PhD: Faculty of Geosciences – Department of Earth Sciences
Institute Earth Sciences – Utrecht University 1982 - 1986	Master's degree: Faculty of Geosciences – Department of Earth Sciences
Institute Earth Sciences – Utrecht University 1977 - 1982	Bachelor's degree: Faculty of Geosciences – Department of Earth Sciences
Rombouts College 1970 - 1977	College degree

Present position: General Director at GeoChemTec: Consulting, Research, Development and Application of innovative Geochemical Technology, following processes of the earth while using reactive minerals for treatment of polluted soil and water.

Years within the firm: 2008 – 2024

Key qualifications in mining industry: More than twenty years of experience in environmental remediation and a thorough understanding of the legal, technical, and economic aspects of operation in the natural environment, waste management, rehabilitation, and treated site closure.

Senior practical experience in laboratory and field testing, cooperation with local stakeholders, research institutes, engineering firms, and government agencies. Preparation of rehabilitation designs ready for application. Provision of services and consultancy to contractors during application of the technology on industrial scale. More than 20 years of practical experience in successful completion of projects such as:

- Design of waste management and closure plans for abandoned Turkish lead-zinc and mercury mines, working as EU key-expert in the Europeaid Mining Waste Management project for implementation of the EU mining waste directive in service of the ministries of mining and environment at Ankara in Turkey.
- Research, development, and application of innovative technology for the geochemical treatment of mining waste rock disposal and the passive filtration with mineral granules of polluted water and rock from the abandoned Baccu Locci arsenic mine, as the first mayor EU-funded mine rehabilitation project of Sardinia in Italy.
- Co-management of the construction, operation, and decommissioning of an Italian pilot plant to produce reactive minerals made from bauxite refining residue at the Eurallumina refinery of Sardinia, Italy.
- Stabilization of concentrated arsenic solution in an abandoned Albanian fertilizer plant.
- Neutralization of acid mining lake water in Aljustrel, Portugal, by means of spraying of alkaline minerals.

Organizational skills: Taking responsibility, also for management of difficult and risky projects, with a good sense for the course of process technology in space and time. Patient with bureaucracy and able to work with partners on all levels of organization, while using digital networks for sharing information and online cooperation, developed, and maintained in-house.

Intercultural skills: Developed while working many years abroad, outside of the Netherlands, starting in Tunisia, then Portugal, Australia, United Kingdom, Italy, and Turkey, readily finding common ground and adapting to local customs.

Language skills: Competence on a scale of 1 to 5 (1 - excellent; 5 - basic)

Language	Reading	Speaking	Writing
Dutch	1	1	1
English	1	1	1
German	1	1	2
French	1	1	2
Italian	2	2	2
Spanish	3	5	5

Membership of professional bodies: Wastewater/Water Treatment Plant Operations and Maintenance, Biological Wastewater Treatment, Sustainable Wastewater Treatment Plants, The Water Network, IMWA Working Group on Life Cycle Assessment (LCA) of Water and Wastewater treatment, MineLife, Acid and Neutral Mine Drainage, International Council on Mining and Metals (ICMM), Mining & Metallurgical Engineers of North America, Engineers in Mining Globally, Mining and Reclamation Regulatory Professionals, KQ Engineering – Mining, E to E Environmental Information Management, Geochemical Link - geochemistry for and by geochemists, Clean air and water, ICSOBA, INTERNATIONAL WASTE & WASTE WATER EXPO INDIA, The Cousteau Society

Other skills: Proficient in use of Microsoft Office applications such as Word, Excel, Access, PowerPoint, SharePoint, web site development, HTML, JavaScript, CSS, Node, PHP and SQL

Technical photography

Open water scuba diving

Specific experience in the region:

Country	Date from - Date to
Netherlands	1994 – 2002, 2019 - 2022
Tunisia	1994, 2014 - 2019
Portugal	2002 - 2003
Italy	2003 - 2013
Turkey	2013 - 2014

Professional experience

Date from - Date to	Location	Company & reference person (name & contact details)	Position	Description
2008 - 2024	Italy, Netherlands	GeoChemTec, (Dir. Hans Zijlstra, hans.zijlstra@geochemtec.eu , +31683908430)	General Director	Development and application of innovative geochemical technology, using reactive minerals for treatment of polluted soil and water.
2013 - 2014	Turkey	Info-Biz, Ankara (Turkey) (Dir. Sinan Bilaloglu, sinan.bilaloglu@info-biz.com.tr ; http://info-biz.com.tr/ , +90(0)5067473654; and project coordinators Ilgin Dolunay, ilgindolunay@gmail.com , +90(0)5351052804; Hüseyin Cahit Ekiz; cahit.ekiz@gmail.com ; +90(0)5322541380)	EuropeAid Key Expert Rehabilitation Abandoned Mining Waste Facilities	Responsible for the design of rehabilitation plans for 2 abandoned metal sulfide mines in Turkey (solid mining waste dumps and percolate treatment systems) as part of Technical Assistance Team for Mining Waste Management Project in Turkey (April 2012- April 2014), co-financed by the European Union and the Republic of Turkey (MoEU, MTA and MIGEM); aiming at development of a structure for the transposition and implementation of Directive 2006/21/EC on the management of waste from extractive industries.

2008 – 2013	Italy	Montana SpA, Milano (Italy) (Ing. Alberto Angeloni, Angeloni@montanambiente.com , www.montanambiente.com); Integra Srl, Vicenza (Italy) (Ing. Alessandro Caviezel, a.caviezel@integramaltauro.com , www.integramaltouro.com)	Technical Consultant	Rehabilitation of the 60.000 tons of tailings and waste dumps of the abandoned Baccu Locci arsenic mining area (Villaputzu, Italy). Solids treatment to decrease Acid Rock Drainage and application of Permeable Reactive Barrier filter systems to treat Acid Rock Drainage from excavated residues that were re-deposited on a hillside in a Central Disposal Site, with impermeabilization by geo-textiles at bottom and top with revegetated slope cover; treatment by means of passive filtration system of Acid Mine Drainage exiting from galleries. (<i>Bonifica e recupero ambientale dell'area mineraria di baccu locci nei territori dei comuni di villaputzu e san vito Provincia di Cagliari</i>)
-------------	-------	---	----------------------	--

2009 – 2011 / 2011 -
2013

Italy

Virotec Italia Srl Roma (Italy) (Dott.
Vittorio Bellò,
vittorio.bello@virotecitalia.com
www.virotecitalia.com)

Technical Consultant

- Demonstration project abandoned Montevecchio zinc mining area (Arbus, Italy). Tailings and waste dump solids treatment to decrease metals and sulphate in Acid Rock Drainage and application of active mixing technology to treat AMD exiting from galleries. (*Trattamento dei rifiuti della miniera di Montevecchio con tecnologia ViroMine™ per Ufficio del Commissario delegato per l'emergenza ambientale delle aree minerarie del Sulcis Iglesiente e del Guspinese*)
- EU FP7 Umbrella Demonstration project at abandoned Ingurtosu zinc ore processing plant (Arbus, Italy). Development of natural cover systems by means of soil generation and re-vegetation study of tailings and waste dumps along Naracauli River

2003 – 2008	Italy	Virotec Italia Srl Roma (Italy) (Dott. Vittorio Bellò, vittorio.bello@virotecitalia.com www.virotecitalia.com)	Chief Scientist	Development of various projects in Italy concerning production and application of transformed bauxite refinery residue (BAUXSOL tm) powder and pellets for active and passive treatment of mining waste water, landfill leachate, municipal sewage, industrial process water, contaminated soil, compost for contamination by heavy metals (Al, As, Cd, Co, Cu, Fe, Mn, Ni, Pb, Sb, Se, Zn), cyanide, fluoride and phosphate.
2002 - 2003	Portugal	Virotec International Ltd, Brisbane (Australia) (Director Bruno Bamonte, bbamonte@virotec.com www.virotec.com)	Chief Science Officer - Virotec Europe	Technical project leader of the treatment of the contamination by tailings and waste dumps of the Aljustrel zinc mine Acid Rock Drainage pond in Portugal (EXMIN assignment) (<i>A commercial application of ViroMineTM technology – Case study Aljustrel Acid Rock Drainage treatment Portugal</i>)
2000 - 2002	Netherlands	Geochem Research B.V., Utrecht (The Netherlands) (Prof. Dr. Olaf Schuiling, r.d.schuiling@uu.nl , (emeritus as of 1998) www.geochem.nl)	Project assistant	Development of waste solid and water treatment projects at laboratories of Unesco-IHE Delft aiming at the establishment of Virotec International Ltd. In Europe
1999 - 2000	Netherlands	Holland Innovation Team Rotterdam (The Netherlands) (Dr. Peter van der Gaag, pvdgaag@xs4all.nl , 0031621213658, www.hollandinnovationteam.nl)	Project assistant	Investigation of various methods for the synergetic recycling of energy industrial (mineral) waste in the port of Rotterdam (The Netherlands),

1995 - 1999	Netherlands	Technology Foundation (STW) Utrecht (The Netherlands) Paul Boontje, p.boontje@stw.nl , (retired as of September 30, 2009) (www.stw.nl)	Scientific/technological project leader	Geochemical/hydraulic /geotechnical engineering: Investigation of a method for elevation of the ground by means of sulphuric acid injection into subsurface limestone at laboratories of Faculty of Geosciences Utrecht and Civil Engineering Department of the Technical University of Delft
1994	Tunisia	Texaco, Kufpeq, Institute Française Petroliere (IFP) (contact persons no longer working there)	Technical consultant	Geotechnical reservoir characterisation Eocene nummulitic lime stones and Maastrichtian Chalk (Abiod)

Other As student, several years of experience as night watch for disabled elderly people, night watch for homeless people at the Salvation Army, tour guide and various jobs as forklift driver and factory operator.

Publications

- Angeloni A. Bavestrelli A., Maroni M. Zijlstra J.J.P., Trattamento di percolati acidi con barriere permeabili reattive ad alta efficienza presso un sito minerario. SiCon 2014 Workshop su: Siti Contaminati. Esperienze negli interventi di risanamento, Brescia, 6-8 Febbraio 2014, 12 p.
- Cappai G, De Gioannis G, Muntoni A, Spiga D, Zijlstra J.J.P., 2012. Combined use of a transformed red mud reactive barrier and electrokinetics for remediation of Cr/As contaminated soil. *Chemosphere* 86 (4),400-408.
- De Gioannis G, Muntoni A, Ruggeri R, Zijlstra J.J.P., 2008. Chromate adsorption in a transformed red mud permeable reactive barrier using electrokinesis. *J Environ Sci Health A Tox Hazard Subst Environ Eng*, 43(8),969-974.
- De Gioannis G, Muntoni A, Spiga D, Zijlstra J.J.P., 2009. Reuse of transformed Red Mud waste in electronically aided reactive barriers for remediation of arsenate polluted low permeability soils. *Proceedings Sardinia 2009 Twelfth international Waste Management and Landfill Symposium* (in press).
- De Giudici, G., Fanfani, L., Pisu, T. and Zijlstra, J.J.P., 2008. Treatment of arsenic-rich mining waste: comparing arsenate binding capacity of Granulated Ferric Hydroxide and Transformed Red Mud. *Rendiconti online Soc. Geol. It.*, Vol. 2, 1-3.
- De Graaff J.W.M., Speck P.J.H.R., Zijlstra J.J.P., Schuiling R.D., 1996. Control of gypsum precipitation resulting from sulphuric acid disposal into limestone (abstr.). *Geol. Soc. Am. Ann. Meet. Abstr. Prog.* 28 (7), 455.
- De Graaff J.W.M., Schuiling R.D., Speck J.H.R., Zijlstra J.J.P., 1997. Geochemical Engineering in Chalk: Neutralization of Waste Sulfuric Acid. *Ann. Soc. Géol. du Nord*, 5, 345-350.
- Dessi, R., Peretti, R., Zijlstra, J.J.P. and Zucca, A., 2010. Passive treatment of percolate from complex heavy-metal mining waste. In: *Proceedings 14th Conference on Environment and Mineral Processing – Part 1*, Fecko, P. & Cablic, C. (Eds), Ostrava, Czech Republic, 265 – 271.
- Knippenberg, S. and Zijlstra, J.J.P., 2008. Chert Sourcing in the Northern Lesser Antilles, The Use of Geochemical Techniques in Discriminating Chert Materials. In: *Crossing the Borders, New Methods and Techniques in the Study of Archeological Materials from the Caribbean*, Hofman, C.L., Hoogland, M.L.P. and van Gijn, A.L. (Eds). The University of Alabama Press, Tuscaloosa, Alabama, USA, 293 p., 43-65 pp.
- Molenaar, N. and Zijlstra, J.J.P., 1997. Differential early diagenetic low-Mg calcite cementation and rhythmic hardground development in Campanian-Maastrichtian chalk. *Sedimentary Geology*, 109, 261-281 pp.
- Ruidas D.K. & Zijlstra J.J.P., 2023. The hardgrounds of the Turonian–Coniacian carbonates of the Bagh Group of central India. *J. Earth Syst. Sci.*, 132 (1), 27 p.
- Schuiling, R.D. and Zijlstra, J.J.P., 2000. *Geochemical Engineering: Natural Solutions for Environmental Problems*. www.eco-web.com/
- Speck, P.J.H.R., De Graaff, J.W.M., Nieuwenhuis, J.D. and Zijlstra, J.J.P., 1998. Optimizing the process of sulphuric acid injection into limestones. In: *Geochemical Engineering: Current Applications and Future Trends*, Vriend, S.P. and Zijlstra, J.J.P. (Eds). *Journ. of Geochemic. Expl.*, 62, 350 p., 331-335 pp.

- Van der Tuuk, L.A. & Zijlstra, J.J.P., 1979. Eerste vondst van een Nostoceras (sic) (orde Ammonoidea) in Nederland. *Grondboor en Hamer* 33: 116-120. **300**
- Van Buchem F.S.P., Vennin E., Joseph P., Gaumet I., Sonnenfeld M., Rebelle M., Fakhfakh-Ben Jemia H., Zijlstra, J.J.P., 2002. 3-D outcrop analogue model for Ypresian nummulitic carbonate reservoirs: Jebel Ousselat, Tunisia. *Institute Francais du Petrole, Report* 56 963, 31 p.
- Vriend, S.P. and Zijlstra, J.J.P., 1998. (Eds) *Geochemical Engineering: Current Applications and Future Trends. Special Issue Journal of Geochemical Exploration*, 62, 350 p.
- Zijlstra, J.J.P., 1987. Early diagenetic silica precipitation in relation to redox boundaries and bacterial metabolism in late-Cretaceous chalk of the Maastrichtian type locality. *Geol. Mijnb.*, 66, 343-355 pp.
- Zijlstra, J.J.P., 1989. Reply on van der Weijden et al. *Geol. Mijnb.*, 68, 263-270 pp.
- Zijlstra, J.J.P., 1995. *The Sedimentology of Chalk. Lecture Notes in Earth Sciences*, 54, 194 p.
- Zijlstra, J.J.P., Brouwers, M.H.M.P., Brinkhuis, H. and De Boer, P.L., 1996. Microfacies analysis of Cretaceous/Tertiary boundary sections in the quarries Geulhemmerberg and Curfs, SE Netherlands. In: *The Geulhemmerberg Cretaceous/Tertiary boundary section (Maastrichtian type area, SE Netherlands)*, Brinkhuis, H. and Smit, J. (Eds.). *Geologie en Mijnbouw*, 75, 293 p., 133-151.
- Zijlstra, J.J.P. 1997. About the depth of deposition of the Maastrichtian Chalk of the type area. *Ann. Soc. Géol. du Nord. T. 5 (2^{ème} série)*, 207-213 pp.
- Zijlstra, J.J.P. 1999. Method for locally elevating the ground: Some aspects of sulfuric acid injection into subsurface limestone (internal report), 58 pp.
- Zijlstra, J.J.P. 1999. Simulation of the genesis of current ripples by means of a cellular automaton. In: *Numerical experiments in stratigraphy: Recent advances in stratigraphic and sedimentologic computer simulations*, 362 p., J.W. Harbaugh et al. (Eds.), *SEPM, Spec. Pub*, 62, 295-298 pp
- Zijlstra, J.J.P. 2019. Transformed red mud for better mining waste management. *Minerals & Metals Review*, August Issue Online, 51-54 pp.
- Zijlstra, J.J.P., and Schuiling, R.D. 2002. Sulfuric Acid for Limestone Injection to Increase Land Elevations. *Proceedings Eighth-Biennial International Symposium: Sulphur Markets Today and Tomorrow*, Amsterdam. Sulphur Institute, Washington DC, USA, 17 pages.
- Zijlstra, J.J.P., Bellò, V., Ruggeri, R., Teodosi, A., 2005. The BAUXSOL™ Technology: An innovative solution for environmental remediation problems. In: *Cossu, R. and Stegmann R. (eds). Proceedings Sardinia Tenth International Waste Management and Landfill Symposium*, 1019 – 1020.
- Zijlstra, J.J.P., Bellò, V., Collu, L., Faux, D., Ruggeri, R., 2007. Passive treatment of AMD with a filter of cemented porous pellets of Transformed Red Mud. In: *Cidu, R., Frau F. (eds). Proceedings IMWA Symposium Water in Mining Environments*, Italy, pp. 299 – 303. Presscolor, Quartu Sant'Elena, Italy.
- Zijlstra, J.J.P., Dessi R., Peretti R, Zucca A., 2010. Treatment of percolate from metal sulphide mine tailings with a PRB of transformed red mud. *Water Environment Research*, Vol. 82-4, 319 – 327.

Student apprentice thesis

- Mureddu, M., 2006. *Indagini di laboratorio sulla capacità del BAUXSOLTM di migliorare la rimozione del Cromo da acque contaminate. Tesi di laurea Scienza dei Materiale, Prof. Piccaluga, G. (Dipartimento di Scienze Chimiche, Università di Cagliari), Dr. Zijlstra, J.J.P. (Virotec Italia srl), 67 p.*
- Corona, M., 2007. *Indagini sulle miscele di BAUXSOLTM cementato per la produzione di pellet poroso, per il trattamento passive, con filtri, di acque e terreni inquinati Tesi di laurea Scienza dei Materiale, Prof. Cannas, C. (Dipartimento di Scienze Chimiche, Università di Cagliari), Dr. Zijlstra, J.J.P.(Virotec Italia srl), 53 p.*
- Floris, M., 2007. *Trattamento Combinato di Terreni Argillosi Contaminati da Cromo Mediante Elettrocinesi e PRB di Fanghi Rossi Bauxitici Trasformati. Tesi di laurea specialistica in ingegneria per l'ambiente e il territorio. Prof. Muntoni, A.& Dott. Ing. De Gioannis, G. (Dipartimento di Geoegegneria e Tecnologie Ambientali, Università di Cagliari), Dott. Ing.Ruggeri, R. & Dr. Zijlstra, J.J.P.(Virotec Italia srl), 149 p.*
- Fancello, D. 2008. *Test di adsorbimento dell'Arsenico sul BauxsolTM. Tesi di laurea in scienze della terra. Dott. De Guidici, G. (Dipartimento di Scienze della Terra, Università di Cagliari), Dr. Zijlstra, J.J.P.(Virotec Italia srl), 19 p.*

Conferences

- SWEMP 7th International Symposium on Environmental Issues and Waste Management in Energy and Minerals Protection, Cagliari, 2002 Italy
- Tenth International Waste Management and Landfill Symposium, S.Margherita di Pula, Italy 2005
- EREM 6th Symposium on Electrokinetic Remediation. Vigo. Spain 2007
- European Minerals Day, Cagliari, Italy 2007
- IMWA Symposium Water in Mining Environments, Cagliari, Italy 2007
- 84. Congresso Nazionale - Società Geologica Italiana, Sassari, Italy 2008
- Ricerche: *Gli scarti industriali e le materie prime secondarie in Sardegna*". Valorizzazione dei residui, procedure e aspetti normativi. Iglesias, Italy 2008
- SAFEMANMIN Workshop on the "Generation, Prevention and Treatment of Acid Mine Drainage, Old and Abandoned Mining Waste Sites – Environmental Risk and Possible Solutions for Remediation", Wien, Austria 2008
- SAFEMANMIN Safe Management of Mining Waste and Waste Facilities, Final Meeting, Brussel/Bruxelles, Belgium 2008
- ICSOBA – Bauxite residue seminar, Goa, India, 2011.
- RemTech Europe 2020 – Going with the geochemical cycle, Ferrara, 2020
- RemTech Europe 2021 - Simpler mining water treatment with geochemical technology and minerals, Ferrara, 2021