Supporting Information

Characterization of chemical composition and bacterial community of corrosion scales in different drinking water distribution systems

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11 pages： 3 Tables, 7 Figures

Table S1 The value range of the main water quality parameters of different pipes from June 2013 to May 2014

parameters	A	B	C	D	E	F	G	H
pH	8.08-8.50	7.69-8.06	7.75-8.01	7.41-7.82	7.95-8.39	7.87-8.13	7.71-8.07	7.59-8.12
NO_3^--N (mg/L)	0.38-0.49	7.02-7.65	9.01-9.98	4.06-5.03	2.76-3.68	2.13-3.02	1.98-2.65	5.02-5.86
Cl^- (mg/L)	155.3-174.8	23.1-28.4	23.9-27.4	24.2-29.5	20.8-30.8	30.0-40.5	29.3-36.7	45.3-51.9
SO_4^{2-} (mg/L)	153.9-185.6	35.8-58.4	27.8-39.6	114.6-172.8	79.0-105.4	122.9-168.5	86.3-117.8	123.7-163.6
Alkalinity (mg $CaCO_3$/L)	138.2-164.8	168.2-190.1	179.1-206.9	204.8-240.9	140.1-174.8	129.7-165.3	128.9-163.2	175.0-206.5
chlorine residual (mg/L)	0.22-0.35	0.20-0.38	0.21-0.38	0.21-0.35	0.20-0.50	0.18-0.45	0.25-0.40	0.15-0.38

Table S2 The used water quality for the iron release experiment

Parameter (Unit)	Value range of used water
pH	7.72-8.10
DO(mg/L)	7.92-8.27
DOC (mg/L)	1.45-1.92
NH_3-N(mg/L)	0-0.05
NO_3^- (mg/L)	4.02-9.46
Cl^- (mg/L)	19.8-22.3
SO_4^{2-} (mg/L)	50.2-76.4
Alkalinity (mg $CaCO_3$/L)	106.2-134.4
Turbidity (NTU)	0.07-0.20

Table S3 The potential corrosive bacteria at genus level

Potential corrosive bacteria[1-4]	Genus		
IOB	Alicyclobacillus Pedomicrobium Sphaerotilus	Gallionella Sediminibacterium Thiobacillus	Leptothrix Sideroxydans
IRB	Arthrobacter Geothrix Rhodobacter	Bacillus Geobacter Shewanella	Clostridium Pseudomonas
SOB	Acidithiobacillus Sulfuricurvum	Alicylobacillus	Sulfuricella
SRB	Desulfosporosinus Desulfotomaculum	Desulfovibrio Desulfobibrio	Desulfomicrobium
NRB	Acidovorax Comamonas Hyphomicrobium Rhizobium	Aquabacterium Dechloromonas Ochrobactrum Simplicispira	Bradyrhizobium Flavobacterium Ralstonia Variovorax
NOB	Nitrospira	Nitrosospira	
APB	Massilia Propionivibrio	Nocardioides Streptococcus	Propionibacterium

[1] Sun, H.F., Shi, B.Y., Bai, Y.H., Wang, D.S., 2014. Bacterial community of biofilms developed under different water supply conditions in a distribution system. Sci. Total. Environ. 472, 99-107.

[2] Yang, F., Shi, B.Y., Bai, Y.H., Sun, H.F., Lytle, D.A., Wang, D.S., 2014. Effect of sulfate on the transformation of corrosion scale composition and bacterial community in cast iron water distribution pipes. Water Res. 59, 46-57.

[3] Jin, J.T., Wu, G.X., Guan, Y.T., 2015. Effect of bacterial communities on the formation of cast iron corrosion tubercles in reclaimed water. Water Res. 71, 207-218.

[4] Shapleigh, J.P., 2006. The Denitrifying Prokaryotes. In The Prokaryotes, Dworkin M, Falkow S, Rosenberg E, Schleifer K-H, Stackebrandt E. (eds) New York, USA: Springer Press, pp. 769-792.

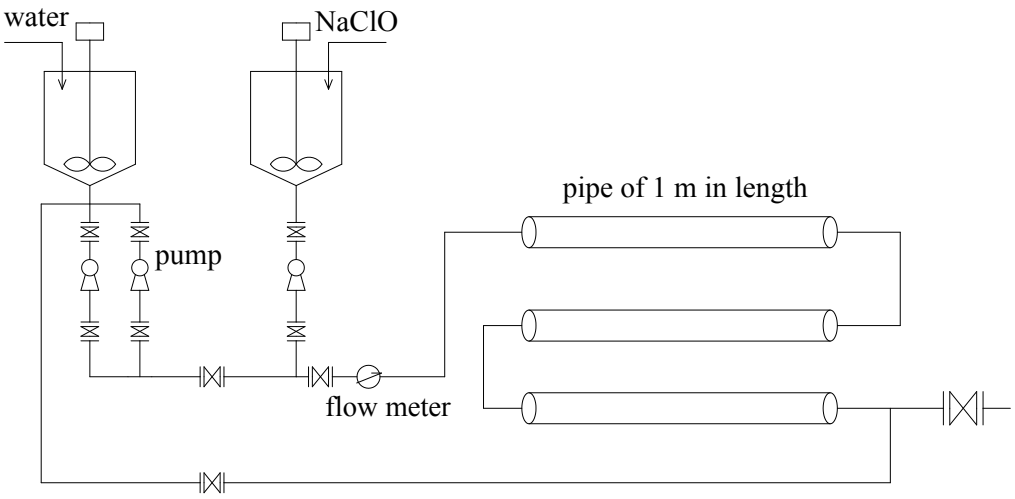

Fig. S1 Schematic of the experimental set-up. There were two facilities in this experiment, one using the pipe A (1 m × 3) and the other one using pipe E (1 m × 3). This figure only showed one facility, and the other one was same to this one.

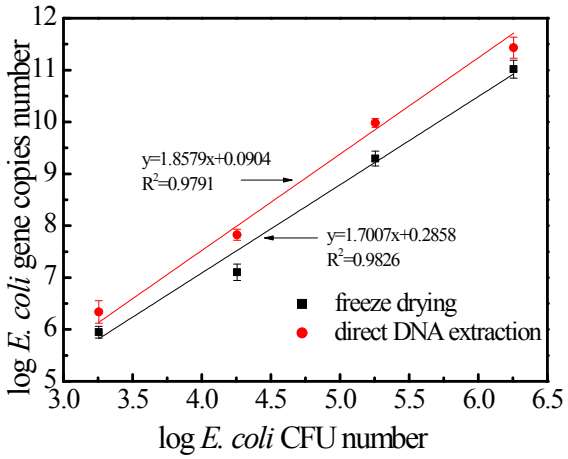

Fig. S2 DNA recovery efficiency of freeze drying concentration method prior to DNA extraction. Linear regression was performed between gene copies numbers and CFU numbers

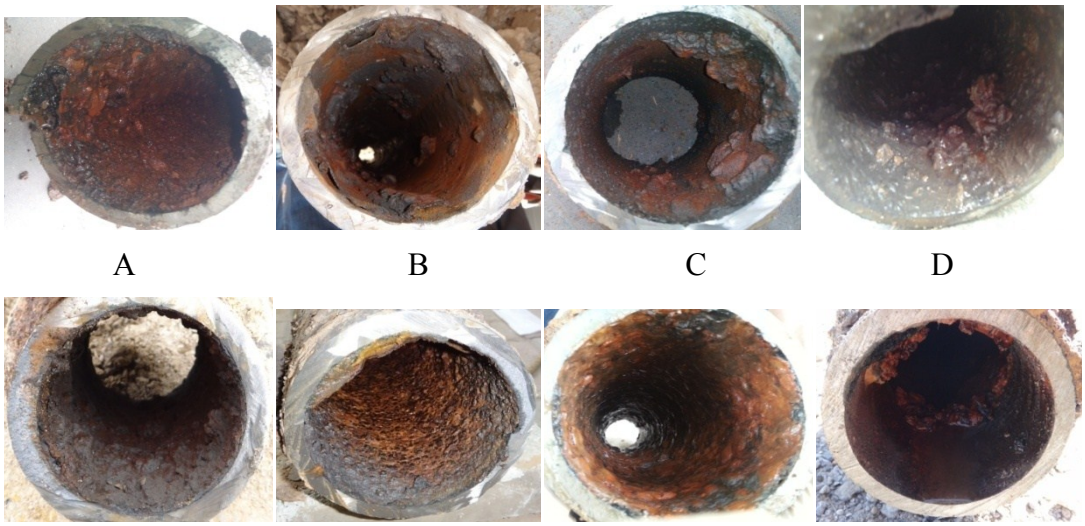

Fig. S3 Photographs of the cut unlined cast iron pipe sections (approximately 20 years) from different cities. Pipes from cities A, B, C and D were transporting groundwater, and pipes from E, F, G and H were transporting surface water. The diameter of all pipes was 100 mm.

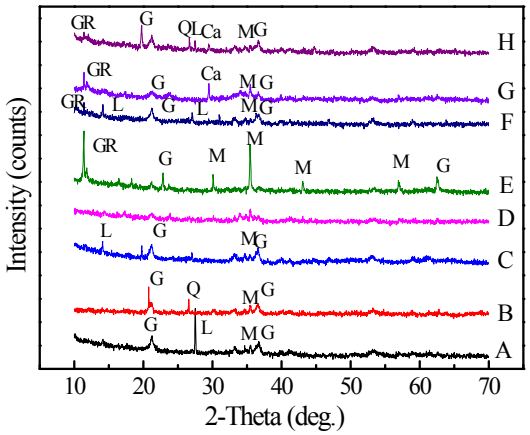

Fig. S4 The X-ray diffraction (XRD) patterns of corrosion scales on the interior of aged unlined cast iron pipes from different cities (G-goethite, L-lepidocrocite, M-magnetite, GR–green rust, Q-quartz, Ca–calcite).

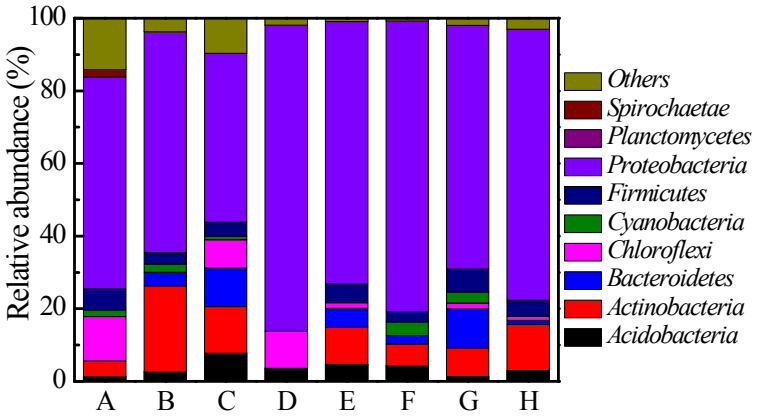

Fig. S5 Relative abundance of bacterial phyla in corrosion scales of different pipes.

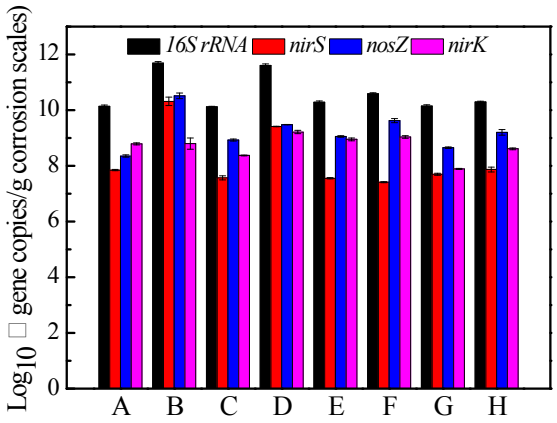

Fig. S6 *nirK*, *nirS*, *nosZ* and 16S rRNA gene copy numbers of corrosion scales from different pipes by qPCR analysis. Error bars represent the standard deviation from the average.

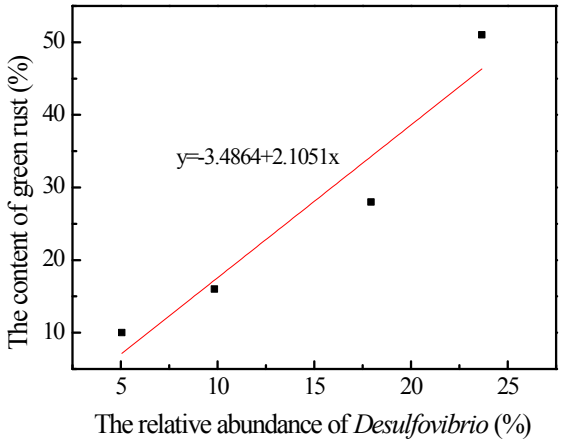

Fig. S7 The linear correlation between the content of green rust and the relative abundance of *Desulfovibrio* in corrosion scales.