

(GIS)

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(GIS)

(Merian et al., 2004)

(Harrison et al., 1981: Surthland et al., 2000)

(Botkin & Keller, 2003)

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Aiuppa et al.,)

(2005

(Dudka et al.,

.1996)

()

()

(Bowie & Thornton, 1985)

()

(Krauskopf, 1995)

(US EPA, 2006)

)

Al,

(

Fe, Mg, Ca, Na, K

As, Bi, Cd, Co, Cr, Cu, Hg,

Mn, Mo, Ni, Pb, Rb, S, Sb, Se, Sn, Sr, Th, Ti, U,
V, W, Zn

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GIS

/ /

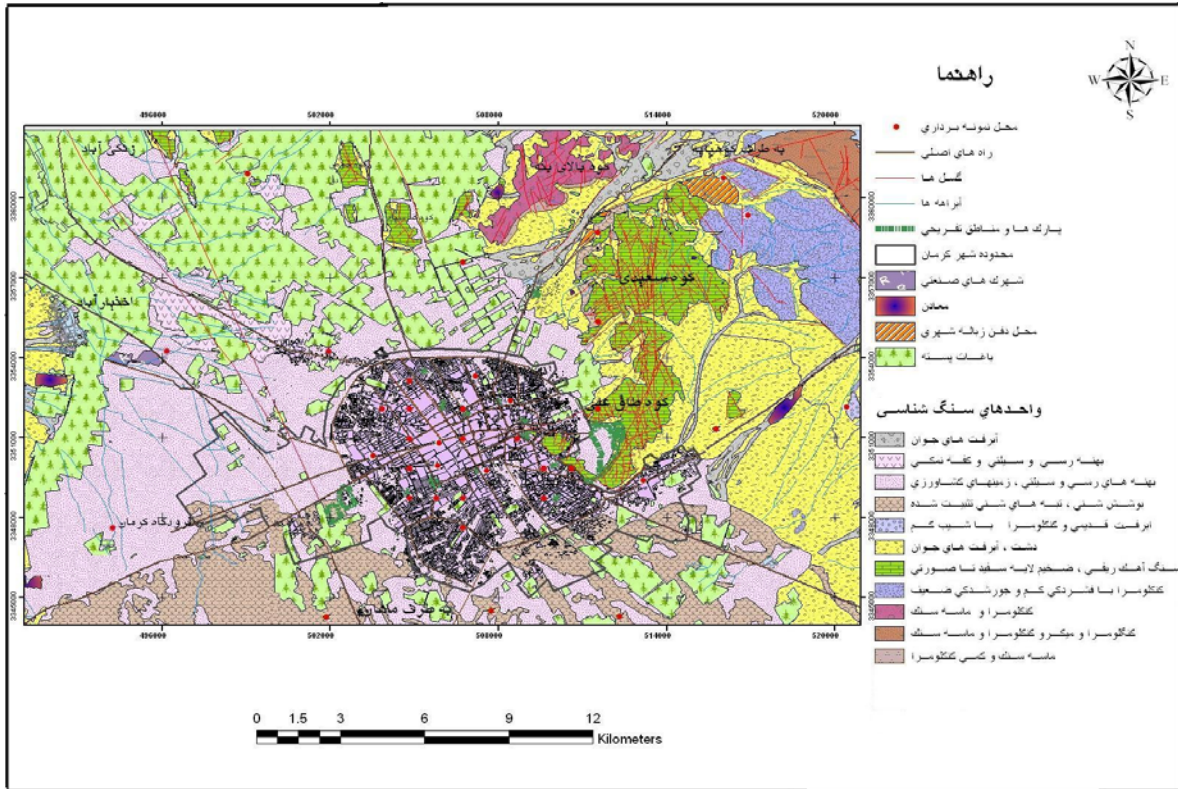
/ /

ArcGIS 9.1

(Atapour & Aftabi, 2002)

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(Atapour &

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(Aftabi, 2002

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(Faure, 1992)

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mg.kg-1

mg.kg-1

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/ / / / /

pH

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/ / / / /

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(ppm)

()							()		
/	/	/	/	/	/	/	/		As
/	/	/	/	/	/	/	< /		Bi
									Ca
/	/	/	/	/	/	/	/	/	Cd
	/	/	/	/	/	/	/	/	Co
		/	/	/	/	/	/	/	Cr
	/	/	/	/	/	/			Cu
							/		Fe
/	/	/	/	/	/	/	/	/	Hg
							/		K
							/		Mg
							/		Mn
/	/	/	/	/	/	/	/	/	Mo
							/		Na
	/	/	/	/	/	> /	< /		Ni
/						/			Pb
	/	/	/	/	/	/			Rb
							/		S
/						/	/	/	Sb
/							/		Se
	/	/	/	/	/	/	/	/	Sn
							/		Sr
	/	/	/	/	/	/	/	/	Th
							/		Ti
/	/	/	/	/	/	/	/	/	U
							/		V
/	/	/	/	/	/	/	/	/	W
							/		Zn

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(Ahrens,1995):() (Bodek,1988) (Faure, 1992):() (

()	(ppm)				: ()	
	/	/		/	/	Al
/	/	/	/	/	/	As
	/	/		/	/	Bi
	/	/	/	/	/	Ca
/	/	/	/	/	/	Cd
	/	/	/	/	/	Co
		/			/	Cr
		/				Cu
						Fe
/	/	/	/	/	/	Hg
						K
						Mg
						Mn
	/	/	/	/	/	Mo
	/	/	/	/	/	Na
	/	/	/	/	/	Ni
	/	/	/	/	/	Pb
/	/	/	/	/	/	Rb
		/	/			S
/		/	/		/	Sb
		/		/	/	Se
				/	/	Sn
				/	/	Sr
	/			/	/	Th
						Ti
	/	/	/	/	/	U
		/				V
	/			/	/	W
						Zn

(Earnshaw&Greenwood,1997) (Ronov&Yaroshevsky,1969):()

U, Ti, Th, S, Mn, Hg, Co, Cd, Bi,

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(Yu Jing et al., 2004)

()

Tl,

V Sn, Se, Ni, Mo, Mn, Hg, Cr

(Merian et al., 2004)

Walker)

(et al., 1995

()

Tl Cd Pb Zn

% %

c

Bi

(Merian et al., 2004)

K Mg, Na, Fe, Cu, Si, Al

Zn Pb, Cd, Se, Sb, As

V U, Sr, Ni, Sn, Cr, Be, Ba

(Merian et al., 2004)

(Eby, 2004)

)

pH

(

()

mg.kg⁻¹

m.Eq/100gr

(α -Al(OH₃))

(α - FeOOH)

ZPC

(Earnshaw &

.Greenwood, 1997)

()

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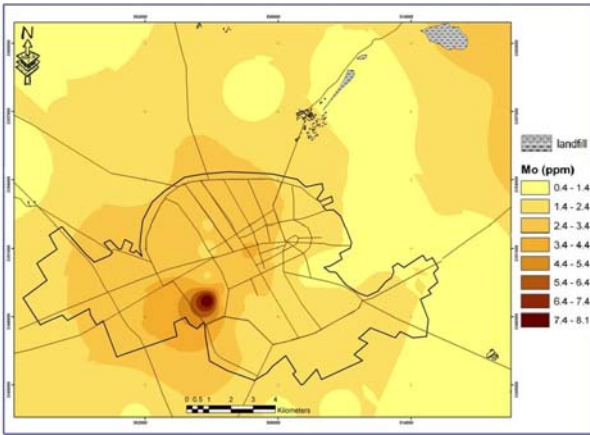
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ArcGIS9.1

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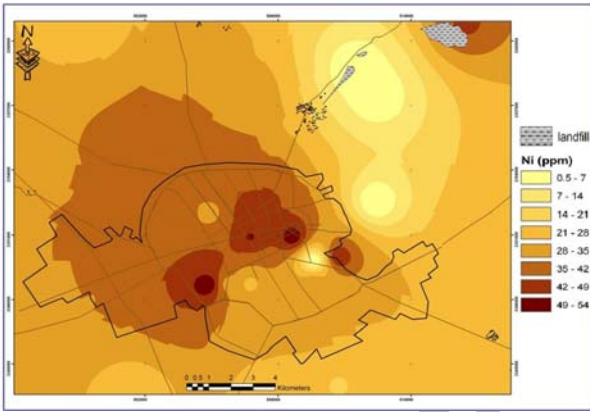
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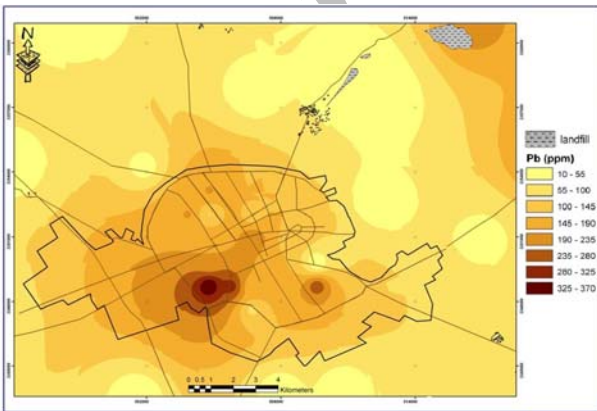
)

(ppm:



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ppm :

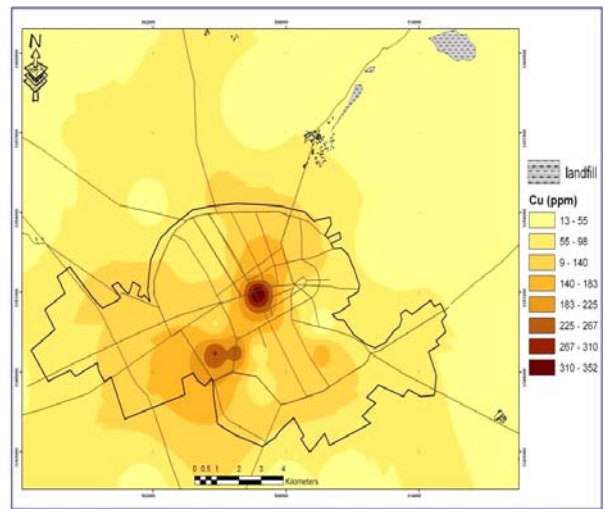


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(ppm



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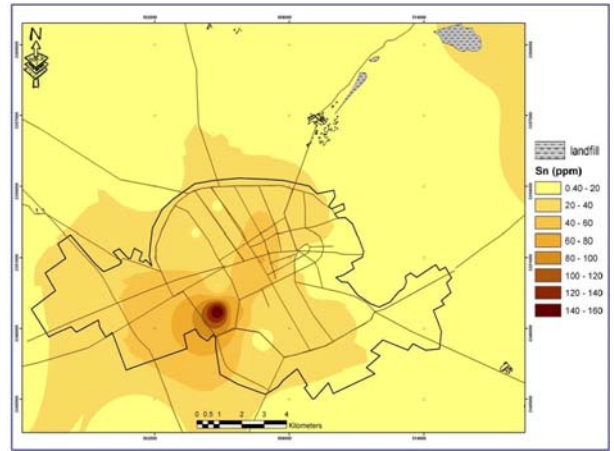
(ppm

(

Hester & Harrison, 1997)

.(Fergusson, 1982)

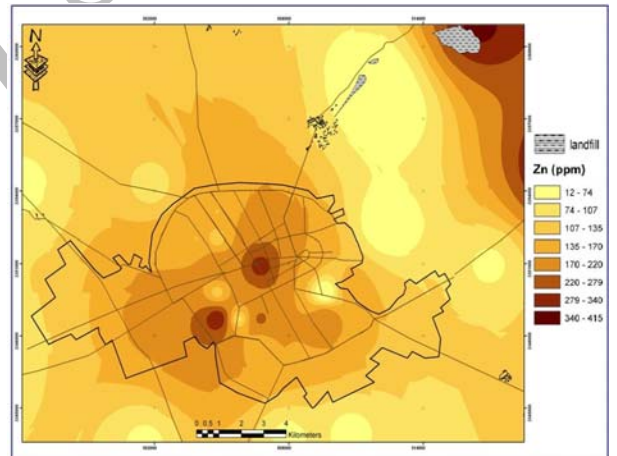
.(Stoessell, 2004)



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(ppm

- 1- Inductively coupled plasma mass spectrometry (ICPMS)
- 2- X-ray diffraction (XRD)
- 3- Zero point of charge
- 4- Phytoremediation



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(ppm

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