

Review

Supplementary Materials: Evolution of Sulfidic Legacy Mine Tailings: A Review of the Wheal Maid Site, UK

Verity Fitch, Anita Parbhakar-Fox*, Richard Crane and Laura Newsome



Figure S1. Sample location map for 2019 experiments, modified from: Crown copyright and data-base rights 2019 Ordnance Survey (Digimap licence); sample photographs; and descriptions of waste samples collected and the analyses performed.

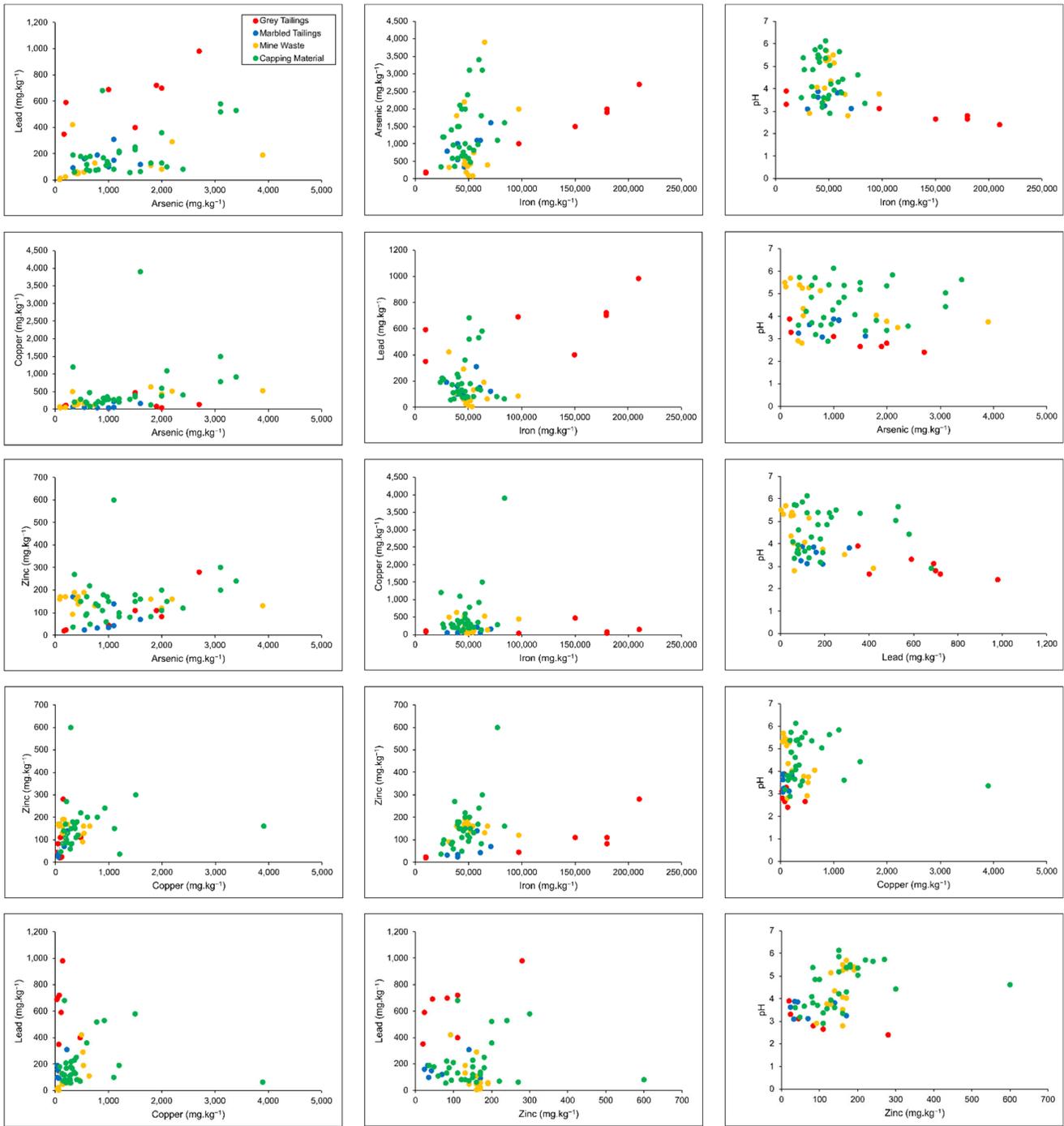


Figure S2. Correlation plots for concentrations of metals and pH in Wheal Maid waste samples (figure drawn from data collected by URS [1]).

Table S1. A list of the 26 significant pollutant linkages (SPLs), modified from [2].

SPL Number	Significant Pollutant	Migration and Exposure Pathway	Receptor
1–2	As	Ingestion, dermal contact and inhalation of contaminated soils	Site users – child mountain bikers
3–10	As, Cd, Cr, Cu, Fe, Pb, Ni, Zn	Leaching from contaminated soils through the lower dam	Controlled waters – St Day stream
11–18	As, Cd, Cr, Cu, Fe, Pb, Ni, Zn	Leaching from contaminated soils through culvert walls	Controlled waters – St Day stream
19–26	As, Cd, Cr, Cu, Fe, Pb, Ni, Zn	Leaching from contaminated soils	Controlled waters – groundwater into the minor aquifer

Table S2. Interviews conducted with organisations and individuals with links to Wheal Maid. Interviewees were asked about their involvement with the site and to supply any documents to help develop a better understanding of the site.

Date	Contact	Role	Discussed	Outcome
05/06/2019	Kim Moreton	Lecturer	SLEM projects on the area	Provided information on previous students work
10/06/2019	Fiona Barnard	Parish Clerk	Parish involvement with the site	Given me an email for the Chair
10/06/2019	Maria Walford	Groundwater and Contaminated Land Team, Environment Agency	EA involvement with the site	Provided reports on the site
10/06/2019	Cornwall County Council	Government Body	Council involvement with site	Received an email back from Stephen Whitehurst
10/06/2019	Neil Wood	Lecturer	Any geophysical data on the site	Provided some ERT data
10/06/2019	Ben Williamson	Lecturer	Past projects	Sent another students masters project
10/06/2019	Wheal Jane Group	Previous Owners of the site	Any info they may have	Received an email back from Bernard Ballard
11/06/2019	Jessica Nicholls	CSM Alumni	Requested a copy of her dissertation	Received a copy of her dissertation
11/06/2019	Stephen Whitehurst	Environmental Protection Officer - Cornwall Council	Requested any reports	Discussed the reports done by URS
13/06/2019	Kevin Furnish	Chair of Parish Council	Requested any studies on the site	Informed of inspections carried out on the dams and the culvert
19/06/2019	Bernard Ballard	Director at Wheal Jane	Processing of Wheal Jane and Mt Wellington	Put in contact with Clifford Rice
27/06/2019	Clifford Rice	Wheal Jane Laboratory Director	Processing of Wheal Jane and Mt Wellington	Arranged a meeting to show him the tailings sampled
03/08/2019	Richard Freeborn	Managing Director of Mount Wellington Mine Ltd	Processing at Mt Wellington	Sent over some drawings of the processing plant at Mt Wellington
07/08/2019	Mark Owen	Former Geologist at Wheal Jane	Processing at Wheal Jane	Explained the technique used and information on the mineral lode
14/08/2019	Lexi King	BSc Honours Student at the University of Tasmania	Asked about her project	Mentioned the names of similar tailings deposits that have undergone little oxidation
16/08/2019	Mike Hallewell	Plant Manager at Wheal Jane	Processing at Wheal Jane	Advised on the flowsheet that was used
09/08/2019	Anita Parbhakar-Fox	Senior Research Fellow at Queensland University	Her involvement with Wheal Maid	Sent over LA-ICP-MS work carried out on pyrite grains

Table S3. A list of the different simulated environments to test oxidation. GT refers to Grey Tailings, MT refers to Marbled Tailings.

Flask	Contents of flask	Factor
ABC	5g GT1 + 50ml synthetic rain (shaken)	Physical
DEF	5g MT1 + 50ml synthetic rain (shaken)	Physical
G	5g GT1 + 50ml synthetic rain (not shaken)	Physical
H	5g MT1 + 50ml synthetic rain (not shaken)	Physical
IJK	5g GT1 + 50ml synthetic rain + 0.1M HNO ₃	Chemical
LMN	5g MT1 + 50ml synthetic rain + 0.1M HNO ₃	Chemical
OPQ	5g GT1 + 50ml synthetic rain + <i>A. ferrooxidans</i> + nutrients	Biological
RST	5g MT1 + 50ml synthetic rain + <i>A. ferrooxidans</i> + nutrients	Biological
U	5g GT1 + 50ml synthetic rain + <i>A. ferrooxidans</i> (no nutrients)	Biological
V	5g MT1 + 50ml synthetic rain + <i>A. ferrooxidans</i> (no nutrients)	Biological
W	5g GT1 + 50ml synthetic rain + nutrients (no cells)	Biological
X	5g MT1 + 50ml synthetic rain + nutrients (no cells)	Biological
Y	50ml synthetic rain + 0.1M HNO ₃ (control for glassware)	Biological