

GLENTOGHER

Background information

Mine Name: Glentogher

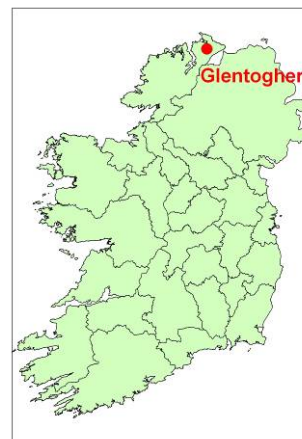
Mine District: Donegal

Alternative Names:

Elements of interest:

Pb, Zn, As, Sb

Project Prefix: Glen-



County:
Donegal

Townland:
Stranagappoge Demesne

Grid Reference:
E247847, N437881

Site Description and Environmental Setting

Glentogher mine is on the Inishowen Peninsula in Co. Donegal, mid-way along the Glentogher River valley between Quigley's Point and Carndonagh. Small volumes of lead ore were mined in the early 20th century from several adits.

The site on either side of the main road immediately north of Mine Bridge but little is visible from the road. The land slopes upwards from the narrow valley and is used mainly for sheep grazing. Habitation is sparse. The Glentogher River, 2-3m wide in the area of the mine, runs northward along the valley floor.

Just north of Mine Bridge, a gated track leads west from the road up to an apparently abandoned farmhouse that sits above the former underground workings. One of three areas of subsidence above the upper adit, as recoded on a sketch map by OBrien (1953), can still be observed. The adit itself (#1 on Fig. 1), just north of the track, is open (above) and can easily be entered through a 2m-high opening. It is blocked by a roof collapse about 30m from the opening. A rise, presumably leading to the lower adit(s), is open in the floor of this adit although an old steel barrel has been forced into the opening as a rough cover. South of the track, grassed-over coarse blocks are probably waste rock from the old quarry that once operated here. The outline of the quarry itself can just be discerned but it is largely filled in and overgrown by trees.

The lower two adits (# 2 and 3 on Fig. 1) have both collapsed. They are visible in the trees to the east of the road. Both discharge water: the flow from the southern one was less than 1.0 l/s during the site visit for HMS-IRC while the flow from the northern adit was significantly less.

An upstanding gable wall (photo, right) beside the entrance to the northern adit is all that remains of what was presumably a mine building of uncertain use.





Fig. 1 Glentogher Mine Features

Geology and Mineralization

The Glentogher deposit is hosted by the Fahan Grits of the Dalradian Southern Highlands Group. The mineralization is stratabound and comprises sphalerite and galena in massive coarse-grained bands and irregular cross-cutting disseminations (McArdle *et al.* 1986). The main Fahan Grits lithologies in this area are psammites and greywackes but the mineralization is within a sequence of bedded calc-psammites and quartzite. Two sheets of metadolerite (the “whinstone” quarried beside the mine), one of which is 1m below the ore horizon, are interbanded with the quartzite (McArdle *et al.* 1986). Bedding dips steeply in the area of the mine (photo, below).

Production and Mining History

Little information is available regarding pre-20th century production although both silver and zinc were supposedly mined along with lead (Cole 1922). The mine was apparently reopened in the early 20th century and 400 tons were raised in 1905 (95 tons lead; 4,000 oz silver) and 1,400 tons of poorer ore in 1906. According to O’Connor *et al.* (1988), the mineralized horizon was explored over a length of 90m.



Geochemical Assessment

1. Surface water

Two surface water samples were collected at Glentogher in September 2007, one from the discharge stream immediately before the point of entry into the Glentogher river (W002) and one from the river itself, 20m further downstream (W001). An upstream sample was not collected at this site. Unfortunately the samples were part of a batch for which the results of the total metal analyses were suspect, with high Pb and Zn concentrations being measured in the lab blank. Consequently, only dissolved element analyses are presented here. Most measured dissolved element concentrations were below the limit of detection, including Pb and Cu. Differences were noted for Zn, Ba, Al and Fe, with the adit discharge having higher Zn and Ba and lower Fe and Al than the downstream surface water sample (Table 1). The electrical conductivity of the stream water (0.04 mS/cm) is very low, typical of clean, somewhat acid waters that are common in bog-covered upland areas in Ireland underlain silicate rocks. The conductivity of the mine discharge is distinctly elevated relative to the stream water though not high in absolute terms and much lower than the natural conductivity of waters in areas underlain by limestone.

Table 1 Chemistry of surface water samples, Glentogher

	pH	EC mS/cm	Zn µg/l	Ba µg/l	Fe µg/l	Al µg/l	Pb µg/l
W002	6.9	0.34	68	60	38	<2	<1
W001	6.2	0.04	44	6	751	126	<1

Available water analyses thus suggest low metal concentrations in the adit discharge and in the downstream surface water sample, with no evidence for exceedance of any water standards.

2. Groundwater

Groundwater samples were not collected in the Glentogher area. As no significant quantity of solid mine waste was identified on site no leachate tests were carried out.

3. Stream sediments

GSI completed a regional stream sediment survey on the Inishowen peninsula in 1985. The area around Glentogher mine was selected for a detailed study as part of the regional survey. A total of 127 samples were collected for the regional survey and a further 65 samples were collected around Glentogher. Table 2 summarizes data for selected elements and Fig. 2 shows the distribution of Pb in stream sediments around the mine site.

Table 2 Summary statistics, stream sediments, Inishowen and Glentogher

	Pb	Zn	Cu	Sb	As	Cr
Inishowen (n=128)						
Min	26	48	14	0.2	2.6	43
Max	221	1388	119	4.1	272	156
Median	50	184	41	0.5	17	89
Glentogher (n=65)						
Min	34	110	24	0.2	4.8	60
Max	660	1060	145	3.6	208	192
Median	67	265	47	0.5	29	110
Downstream mine (n=16)						
Min	60		39	0.5	25	60
Max	660		78	2.2	173.5	152
Median	142		47.5	1.0	36.5	109

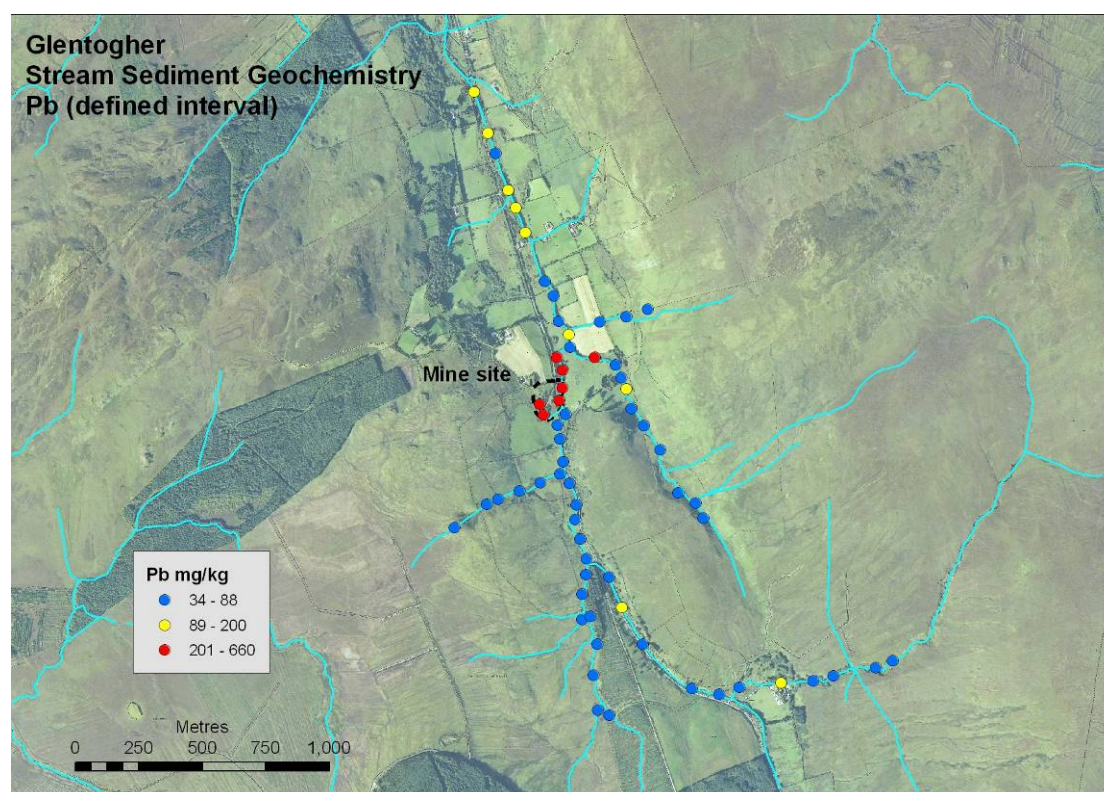


Fig. 2 Distribution of Pb in stream sediments, Glentogher

Table 2 compares statistical data for stream sediments downstream of the mine to that for the wider Glentogher area and Inishowen. Pb is clearly enriched in stream sediments downstream of the mine, as shown in Fig. 2, and O'Connor *et al.* (1988) have shown that Sb is also somewhat enriched. However, the data for other elements are less clear-cut. Only As appears to be somewhat enriched in sediments downstream of the mine. Data are not available to allow estimation of statistics for Zn downstream of the mine but previous maps (O'Connor *et al.* 1988) do suggest elevated levels downstream of the mine but they also show isolated very high concentrations elsewhere in Glentogher. The maximum concentration of Zn recorded at Glentogher was in a sediment sample taken upstream of the mine. Cu and Cr have higher median values in the Glentogher area compared to the rest of Inishowen but the median values in sediments downstream of the mine are indistinguishable from those recorded for the rest of Glentogher as a whole.

4. Solid waste

No solid waste was identified at Glentogher so no *in situ* XRF analyses were carried out.

5. HMS-IRC Site Score

Table 3 Site Scores for Mine Waste, Glentogher

Waste	W002	Stream Sediment	Total
1. Hazard Score	5	19	24
2. Pathway Score			
<i>Groundwater</i>	0.02	-	0.02
<i>Surface Water</i>	1.06	-	1.06
<i>Air</i>	-	-	
<i>Direct Contact</i>	-	-	
<i>Direct Contact (livestock)</i>	-	3.85	3.85
3. Site Score	1	4	5

The HMS-IRC Site Score is 5 (Class V), one of the lowest recorded for any mine site. The lack of solid waste and the low metal concentrations in the adit discharge limit the potential for a significant score. Stream sediments account for most of the score, based on the perceived downstream impact from mining, and thus the dominant pathway score (78% of total) is that for Direct Contact (livestock). The Surface Water pathway accounts for virtually all of the remaining score, reflecting the discharge from the adit directly to the river.

6. Geochemical overview and conclusions

Glentogher mine was a small mine that produced a limited quantity of lead ore. There is no clear evidence that it has had or continues to have any major impact on its surroundings. Water analyses do not indicate contamination of the downstream surface water by the adit discharge which has low metal concentrations. Lead and Zn concentrations in stream sediments in the Glentogher area are higher than those found in Inishowen as a whole and Pb concentrations downstream of the mine are

higher than those upstream. This suggests some downstream impact from mining. Median concentrations of other metals, such as Cu and As, in stream sediments downstream of the mine are not readily distinguishable from those recorded for the rest of Glentogher as a whole.

References

Cole, G.A.C. (1922) Memoir and Map Localities of Minerals of Economic Importance and Metalliferous Mines in Ireland. *Memoirs of the Geological Survey of Ireland*.

McArdle, P., Reynolds, N., Schaffalitzky, C. and Bell, A.M. (1986). Controls on the mineralization in the Dalradian of Ireland. In: Andrew, C.J., Crowe, R.W.A., Pennell, W.M. and Pyne, J.F. (Eds.) *Geology and Genesis of Mineral Deposits in Ireland*. Irish Association for Economic Geology, Dublin, 31 – 43.

O'Connor, P.J., Reimann, C. and Kürzl, H. (1988) A geochemical survey of Inishowen, Co. Donegal. Geological Survey of Ireland Report Series RS 88/1 (Geochemistry), pp43 plus maps.