





Commercial Open Loop Installations

Best Practice

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Agenda

- LoopMaster (Europe) Ltd
- What is Open Loop
- Open Loop Pro's & Con's
- When should the geothermal designers be involved ?
- Getting Started Feasibility
- The Importance of Assessing Thermal Interference
- Critical Drilling Procedures
- Summary







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- Technical consultancy formed to help engineers or companies who are looking to install ground source geothermal heating and cooling systems
- Formed in 2004, now with 16 staff
- Evolved from drilling contracting
- Based in Nuneaton, Warwickshire (UK)
- Includes experienced drilling engineers and contrac managers
- Provide support in the drilling processes for commercial geothermal technology

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Sir Robert M^cALPINE

PLANTS PEOPLE POSSIBILITIES









Open Loop Scheme





Open Loop Geothermal System – Pro's & Cons

<u>Pro's</u>

- Offer good energy source when good flows achieved
- More cost effective than closed loop on larger schemes
- Requires comparatively small area to install
- Less disruption to build programme than closed loop

<u>Con's</u>

- Uncertainty regarding achievable flow rates
- Subject to lengthy & complex regulatory process
- On-going maintenance required
- Time limited abstraction licenses & Discharge Consent





'rogramming - How Long to Install & Licence an Open Loop Scheme ?

Site X Islington – Geothermal Drilling Operational Programme Indicator Two Drilling Units Installing and Testing 8nr Boreholes

10	Task Name	Start	Finish	Duration	Jan 2008	Feb 2008	Mar2008	Apr 2008	May 2008	Jun 2008	Jul 2008	Aug 2008	Sep 2008	Oct2008	Nov 2008	Dec 2008	Jan 2009	Feb 2009	Mar 2009	Apr 2009	May 2009	Jun 2009	Jul 2009	Aug 2009
שו																								
1	Carry out hydrogeological feasibility report	02/01/2008	3 29/01/2008	20d																				
2	Stage 1 modelling Investigation	21/01/2008	22/02/2008	25d																				
3	Application for consent to Drill	01/01/2008	10/03/2008	50d																				
	Application for Licence to Discharge Produce Specification Documents	0 10 02000	100002000	004																	_			
4	complete tender process & recommend drilling contractor to clients team	05.																						
5	Allow 4 week nominal lead time for contractor to mobilise	18			1 /							Л												
6	Site Preparation & Mobilisation of Plant	16) r	N T		C								
7	Drilling Borehole 1 (Unit 1)	26								5														
8	Borehole No.1 Development	16									IV					_]			-					
9	Drilling Borehole 2 (Unit 2)	26																						
10	Borehole No.2 Development	16																						
11	Drilling Borehole 3 (Unit 1)	30										-												
12	Borehole No.3 Development	21/07/2008	01/08/2008	10d																				
13	Drilling Borehole 4 (Unit 2)	30/06/2008	18/07/2008	15d								_												
14	Borehole No.4 Development	21/07/2008	01/08/2008	10d																				
15	Drilling Borehole No.5 (Unit 1)	04/08/2008	22/08/2008	15d																				
16	Borehole No.5 Development	25/08/2008	05/09/2008	10d																				
17	Drilling Borehole No.6 (Unit 2)	04/08/2008	22/08/2008	15d																				
18	Borehole No_6 Development	25/08/2008	05/09/2008	10d																				
19	Drilling Borehole No. 7 (Unit 1)	08/09/2008	26/09/2008	15d																				
20	Borehole No.7 Development	29/09/2008	10/10/2008	10d																				
21	Drilling Borehole No.8 (Unit 2)	08/09/2008	26/09/2008	15d																				
22	Borehole No.8 Development	29/09/2008	10/10/2008	10d																				
23	Demobilisation of All Heavy Plant	13/10/2008	17/10/2008	5d																				
24	Test Pumping Operations including tracer tests	21/08/2008	10/12/2008	80d																				
25	Final Equipment Installation & Commissioning (Can be carried out at any point during build)	17/06/2009	06/07/2009	14d																				
26	Stage 2 modelling	30/01/2009	18/02/2009	14d																				
27	Thermal / Hydraulic Impact Assessment to satisfy EA discharge officer	09/03/2009	03/04/2009	20d																				
28	Formal Licensing & Discharge Consents	17/12/2008	25/08/2009	180d																				



Getting Started – When to Involve the Geothermal Designers When <u>does</u> geothermal tend to appear on the Radar ?





Getting Started – When to Involve the Geothermal Designers

Where it should appear on the radar?





Getting Started - Feasibility

- Assess.....
- General hydrogeological conditions (A fighting Chance ?)
- EA Stance SPZ / SSSI
- Understand What the Client / Team Are Expecting the Ground to Do – Amount of heat rejection
- Assess potential areas for drilling / Deep Infrastructure - London
- With the above boxes ticked.....Move into phase one focussed feasibility study
- If hydrogeological and logistical factors are satisfactory move on to phase two feasibility – thermal impact investigation



Hydrogeological Appraisal & Feasibility Report for Open Loop Geothermal Installation

For

Site X London,



Report 2422/r1-LM999



The Importance of Assessing Thermal Interference

- It is vitally important to assess system sustainability
- Where building profile is not balanced, the potential for system inefficiency or failure is very real
- If distance between abstraction / recharge 'zones' is small, the sustainability question is even greater !
- Numerical Models required to assess heat transmission through aquifer
- Modelling is expensive but very necessary
- It may take several years for sustainability issues to manifest themselves Are your contractors going to be around then ?



Schematic Courtesy zenithinternational



Thermal Impact Assessment – Why?



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Critical Drilling & Test Pumping Procedures !

- The design of the well is critical for optimising available yields
- The way in which the drilling contractor undertakes the work is also critical to the success of the well
- Analysing test pump data is critical to understanding the well hydraulics and sustainability of the system. It is this analysis that determines the second stage development process and demonstrates the system to the EA hydrogeologists









nterpreting Data





Who's Doing Your Job?

ø You must carefully scrutinise your contractor / consultant

- ø If they claim they have completed similar works, get references; Don't take their word for things !
- ø Get an understanding of the company structure. It is possible that the organisation is fronting a group of sub-contractors. If they are, scrutinise their sub-contractors !
- ø Don't make the mistake of assuming that they are competent. It is upto the team to determine who and why they employ someone.



Drilling Contractors

Good Contractors in very short supply !!

Drilling contractors are not designers. They need direction and supervision ; They carry no Pl Beware of inexperienced drilling contractors. Every drilling contractor now adds "Geothermal Drillers" to their resume's. <u>Beware !</u> : Geothermal drilling is not all the same. Open Loop is very very specialised work !





Summary

- Hydrogeological and thermal feasibility assessments must be evaluated at an early stage of the project
- Early dialogue with the EA office concerned is essential
- Whoever is to design and install your project, assess their capabilities and track record. Make sure you get references from other similar projects – Do not take their word for it !
- Remember, drilling can be very unpredictable !! Make sure that a comprehensive technical document is used where work is to be sub-contracted to drillers. A detailed and clear scope and material spec. is essential
- Make sure that both the reporting and way in which the work progresses is totally transparent to the team



Thanks For Listening & Good Luck !

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