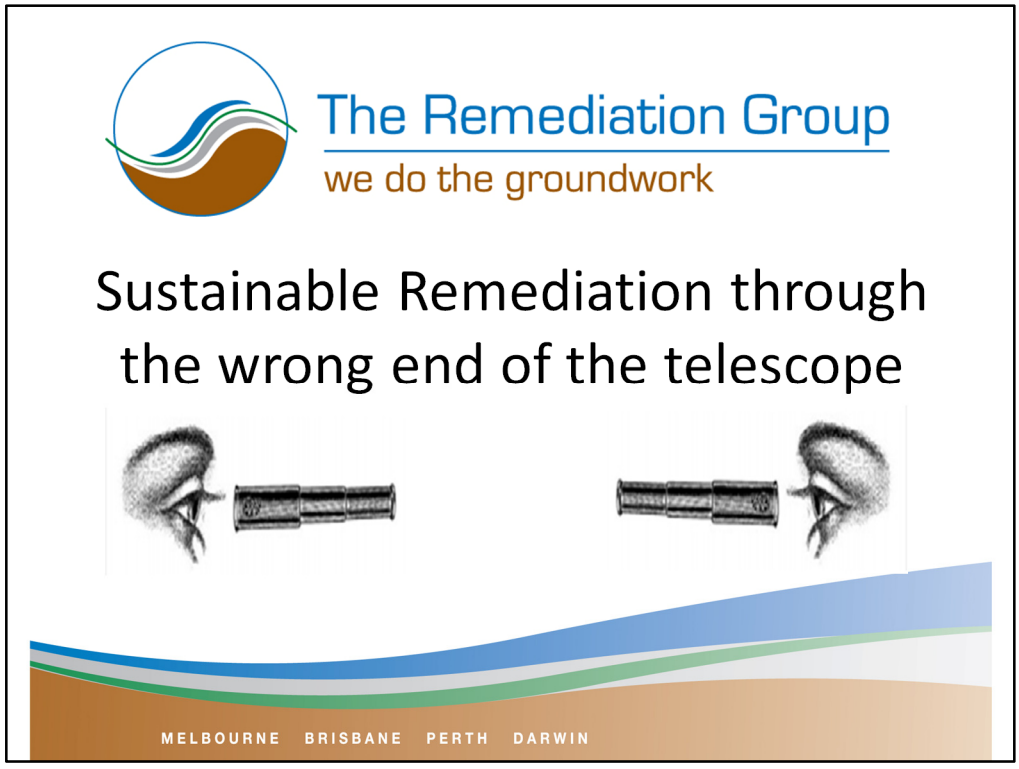

The genesis for this talk was a somewhat rigorous debate during an ALGA board meeting about the virtues of the Sustainable Remediation Tool that was originally featured in a presentation by John Claypool from AECOM at the Ecoforum 2011. I had expressed the view that such an approach was looking at the issue of sustainable remediation through "the wrong end of the telescope". So to some extent this is my response to Stephen's friendly "put up or shut up" challenge thinly disguised as an invitation.

For those of you who did not attend John Claypool's presentation or have not come across the SRT, it is essentially a complex spreadsheet that requires a lot of site specific data to be collected and predicted, and with the help of some assumptions it scores and ranks each remediation method according to its sustainability thereby helping in the selection process.

It is important to note that the US military funded the development of the tool in order to comply with executive order 13514 issued by the President Obama October 19, 2009. I'll come back to this shortly.

Sustainable Remediation Tool (SRT)

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On face value this seems like a perfectly reasonable tool. Peter made the conciliatory point that it is one tool that can be used to help in the selection process.

So why do I have a problem with SRT as a means of making remediation more sustainable?

Before I answer that question can I open it to the floor. Does anybody here have any reservations about the tool and prepared to share them briefly? It can't just be me.

Issues with SRT

- Errors in data collection
- Invalid assumptions
- Compounding estimations
- Bias

- Engineering philosophy that presupposes that it is an Engineer's inalienable right, duty and ability to predict, understand, and control the world around them. It is a philosophy that lacks the humility to acknowledge what is unknowable and undervalues the fundamental scientific tool of observation.

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I expected to hear:

1. Errors in data collection could lead to inaccuracies in calculations;
2. Compounding estimations could throw out the results;
3. Assumptions are not realistic or applicable; or
4. Bias on the part of the Engineers using the tool may favour preferred remediation methods. (For some consultants, suck trucks would come out as the way to go regardless of what tool was used)

… but my major concern is none of these. Instead, it is the Engineering philosophy that underpins this approach that gets up my nose. The philosophy presupposes that it is an Engineer's inalienable right, duty and ability to predict, understand, and control the world around them. It is a philosophy that lacks the humility to acknowledge what is unknowable and undervalues the fundamental scientific tool of observation.

For those of you have come in late or nodded off already, I am here to challenge the virtues of SRT and by doing so I am having a go at AECOM one of the world's largest engineering firms, the US Military, the US President and just to nail it I am having a swing at Engineers who just happen to make up most of my audience and client base for that matter. Oh well, at least I am giving the lawyers a break tonight; I might need them!

More issues with SRT

- Only get to test the chosen remediation strategies.
- What happens when reality strikes?
  - Storm water drain not on plans
  - Required pumping rate not 20K but 600K L per day
- "Sustainability" is becoming the excuse of first choice of polluters to avoid remediation surpassing:
  - Risk Based Assessment
  - Monitored Natural Attenuation

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In order to rank a selection of remediation technologies/approaches Engineers using the SRT software would attempt to establish or predict such things as:

1. Volume of LNAPL lost,
2. Volume of LNAPL recoverable,
3. Mass recoverable in vapour phase,
4. Energy required,
5. Number of trucks required,
6. Fuel consumption and so on …

across the various remedial options. Who knows they may actually be accurate on some of these things.

The elegant thing about this approach is that you only get to test how accurate the SRT tool is on the chosen remediation method(s). All the others remain in the speculation box never to be tested regardless of how effective they may have actually been.

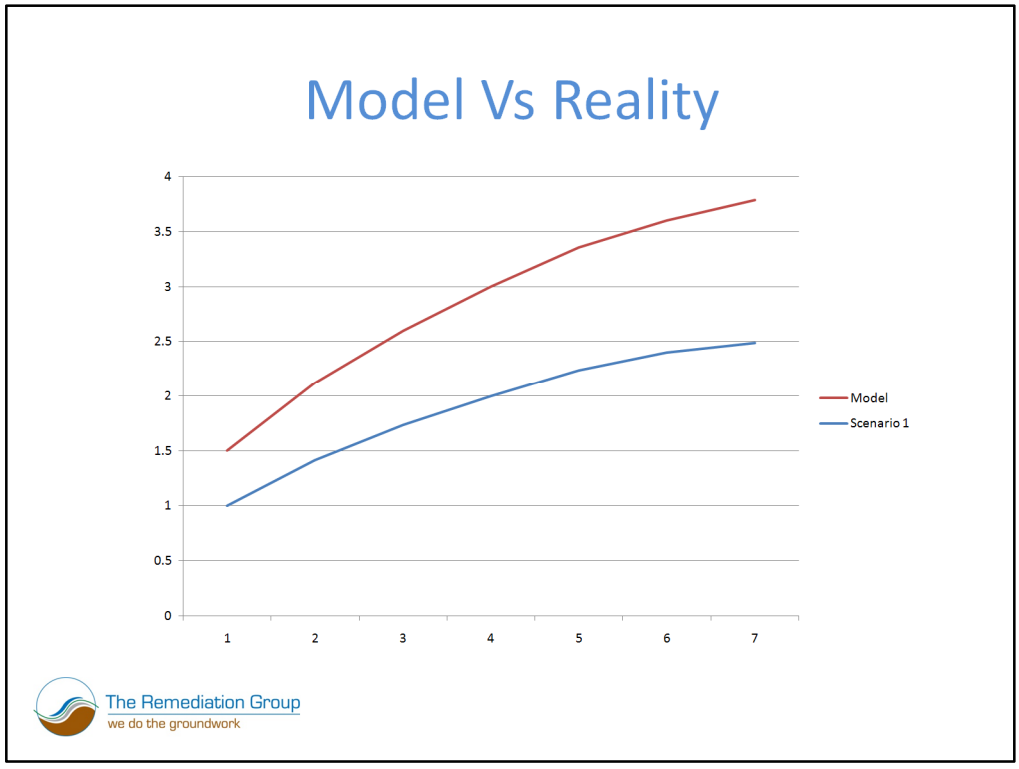
Assuming that a remediation pathway is selected by this tool and acted upon, what happens when reality strikes? That is,

1. You discover the preferential pathway in the form of a storm water drain big enough to walk through but was not on any plans.
2. Or the groundwater recovery rate required to maintain a depression turns out not to be the 20,000 litres per day the model predicted but 600,000 L per day.

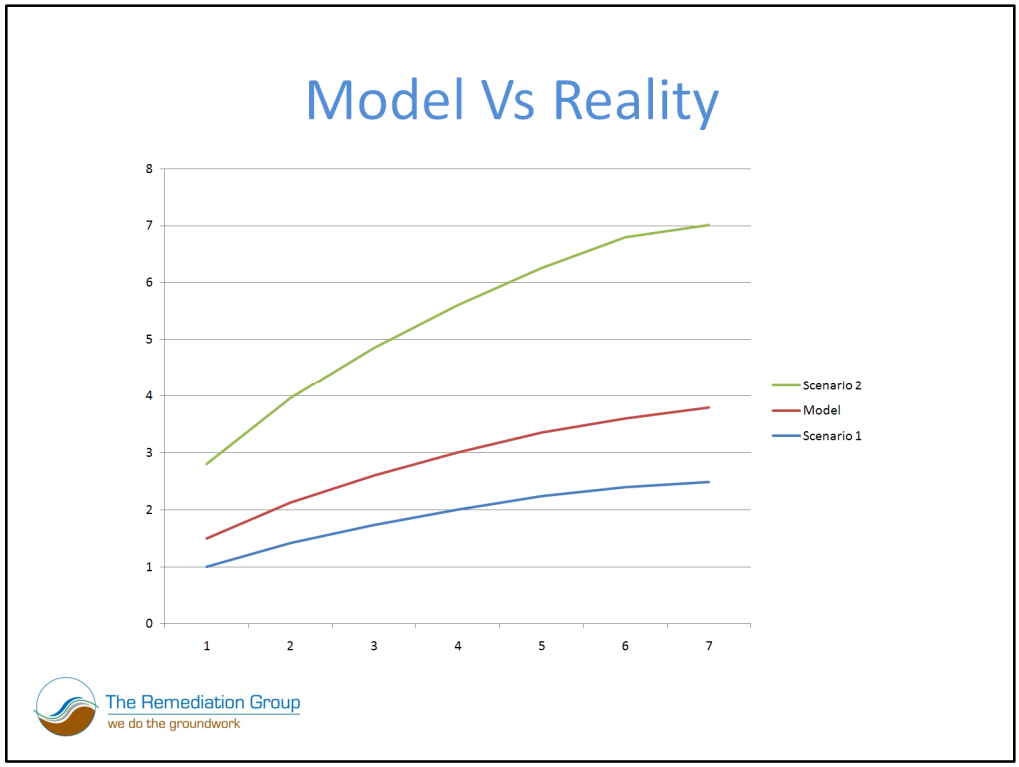
These may seem made up but they are actually real examples. Curiously, when the storm water drain was discovered nobody questioned what difference it made to the plume migration model. Oh, and the Hydro still has his job.

Sustainability assessments of various remediation strategies using this free SRT software could be a great way to chalk up consulting hours but are we seeing a new sophisticated "excuse of first choice" for polluters to avoid remediation surpassing RBA and MNA.

And to put this into context. The bulk of the work in the remediation sector comes from the Petroleum Industry which by virtue of the finite nature of the resource is unsustainable but due to the lifestyle benefits it affords it is deemed acceptable. Curiously though "sustainability" is used as an argument for avoiding active remediation strategies to clean up the mess this industry creates.



To illustrate my point consider this simplified example. If the model that was used to assess the sustainability of a particular technology predicted the mass recovery over time would follow the red curve but in reality the mass recovered plotted the flatter curve what would you do? Keep going because the model says so?

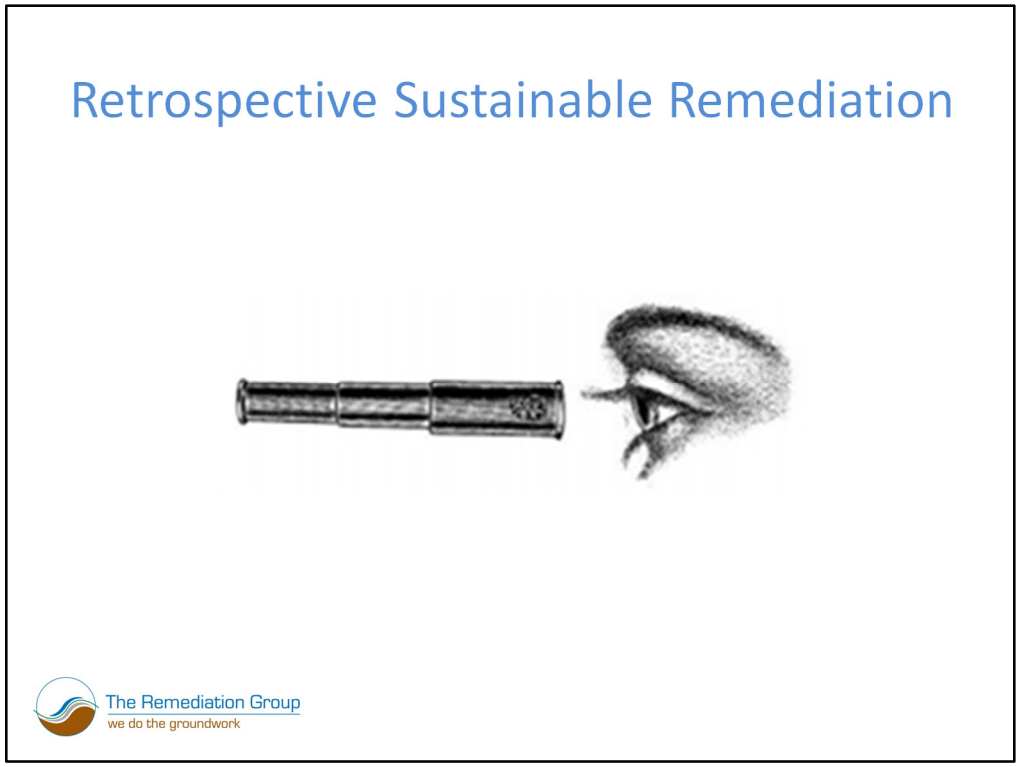


On the other hand if in reality you recovered mass according to a the top curve would you stop when you have achieved the modeled recovered mass? Surely not.

Would your decisions in the face of reality be any different if you didn't have the model?

Where does this outcome leave your assessment of the sustainability of the chosen approach and that of the other methodologies you have already excluded as unsustainable?

But if I have not convinced you to be as cynical as me towards this tool then rest assured that there is a road show planned for later in the year whereby a guru will be flying out to Australia all the way to and from the US and flown through all the major cities to talk about it, all in the name of sustainability. Am I missing something here?



I would like to also draw you attention to another virus that is creeping into the field of sustainable remediation and that is what I call Retrospective Sustainable Remediation.

Perhaps you can recognise where I am heading with this based on the image.

This involves getting to the end of a remediation project before throwing a “Sustainable Remediation” perspective over what has already been done. There was a presentation given at Ecoforum this year that explained how “sustainability” underpinned decisions that were made during the course of the project in particular the technology selection. If you adopt this version of sustainable remediation you need to be careful that your audience doesn’t know the real commercial and even self interest based reasons for the technology selected. I could be more specific and name the site but I can see the lawyers are licking their lips already.

Just remember the old saying that you can throw a cow cover over a horse but you won’t get milk in the morning.

Here's a radical idea

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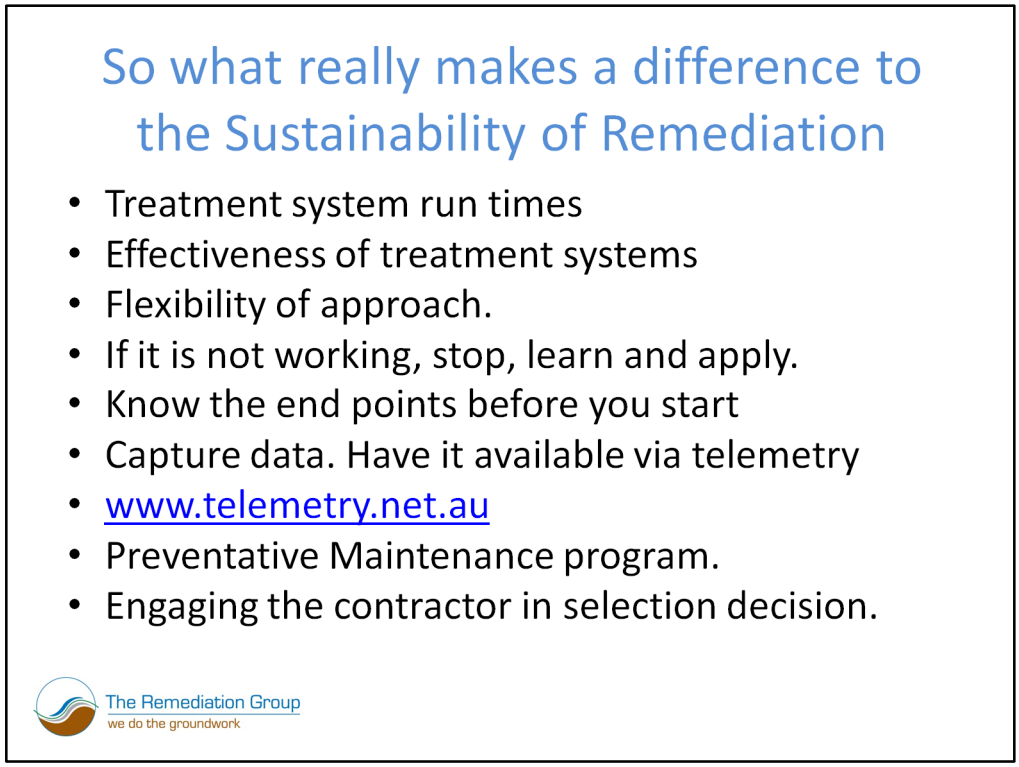
How about we start by selecting remediation technology on the likelihood of them achieving clean up objectives.

… And then make sure they are applied in the most sustainable way.

This is perfectly consistent with CRC Care technical Paper #2.



So what really makes a difference to the sustainability of remediation?

Start by dealing with reality rather than a model of it. Existential Remediation if you please. Then the following factors become paramount.

Treatment system run times:

- Statement of the bleeding obvious but if the system isn't running it won't be doing much good.
- Conversely when systems do operate close to 100% of the time they can shorten project lengths.

Effectiveness of treatment systems:

- There is no point in systems running if they aren't achieving anything.
- Effectiveness has to be monitored regularly.
- Make run times and treatment outcomes part of the contract.

Flexibility of approach:

- Single strategies rarely achieve all of the clean-up objectives
- Consider renting systems sequentially or have systems that can be operated in different modes.

If the strategy is not working, stop, learn and apply:

- This can cause embarrassment and finger pointing but get over the fact that none of us get it right all the time. Learning from mistakes is one of the fundamentals of scientific discovery.

Knowing the end points before you start is absolutely critical to avoid the nonsensical situations of not knowing when to turn a system off. Most projects we are asked to build systems for do not define the end point from the start. Not to us at least.

Capturing data that underpins the achievement of the end points seems so obvious but it is incredible how rarely it is asked for. This is the telemetry system we use.

Preventative maintenance programs are fundamental to high run times, treatment effectiveness and ultimately achieving clean up objectives sustainably and cost effectively.

If you really want to be progressive engage your contractor in the technology selection process and be prepared to pay for their advice. Somebody wrote in the "Reactor" section of the latest ALGA Newsletter that the difference between consultants and contractors is that contractors are expected to know what they talking about and provide their advice for free while consultants charge for their advice.

Philosophical shift required

- I am an Engineer there for I accurately know, predict and control
- … to …
- I am an Engineer therefore I will endeavour to understand, observe and resolve.

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To finish where I began. In response to SRT and Sustainable Remediation in general, I think what is needed is a change in how you look at things; that is a shift in Engineering philosophy. So with apologies to Descarte for bastardising his line “I think; therefore I am” could I suggest a change from what I perceive to be the norm:

I am an Engineer therefore I accurately know, predict and control

… to …

I am an Engineer therefore I will endeavour to understand, observe and resolve.

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Thank you.