

Submission

to

Inquiry into the Environment Protection and Biodiversity Conservation Amendment Bill 2013 [Provisions]

By Jeffrey Kite

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Senate Standing Committees on Environment and Communications
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I, Jeffrey Maxwell Kite of 1248 Thunderbolts Way, Gloucester, NSW request that the Committee of Inquiry, consider this submission, knowing that I have not met the advertised due date for submissions. However in delaying this submission, I have had the benefit of having more time to review previous reports and review some of the comments by different agencies/organisations since the inquiry deadline. I have not been able to review the Inquiry transcript in any detail.

I am a retired Water Resources Engineer, having spent 25 years working for the Western Australian Government water utility and (mostly) water resources management agencies between 1975 and 2000.

I now live in Gloucester and have done so for the past 7 years. I am president of the Gloucester Environment Group and a member of both the Barrington Gloucester Stroud Preservation Alliance and Gloucester Residents in Partnership. However, I make this submission as a concerned resident of Gloucester

Introduction

I have been in Gloucester for the period that AGL have carried out exploration for coal seam gas and received conditional approval from both State and Federal Governments. As you would be aware, we also have one existing coal mine close by at Stratford and another further away at Duralie. Both of these mines are now owned by the (I understand) State-owned Chinese company Yancoal. The Stratford mine is currently subject to environmental impact assessment (EIA) for a major expansion and a proposed mine being proposed by Gloucester Resources known as Rocky Hill Coal Mine (RHCM), whose environmental impact statement (EIS) is proposed to go on exhibition on 2 May 2013.

I'm making this submission at this stage is due to my concerns relating to water issues associated with the AGL's Gloucester Gas Project (GGP) and the Stratford Expansion Project (SEP). However another major area of concern is the highly important issue

of cumulative impacts which I believe is handled very poorly by both the current State and Federal legislation and associated Government agencies.

I will also comment on the failure of State and Federal Government processes and agencies to effectively carry out the environmental impact assessment of the AGL project prior to conditional approval.

I read that representatives of the Independent Scientific Committee (as reported by the ABC) in their presentation to the current Inquiry, noted that for “new coal seam gas proposals the quality of environmental assessments provided by companies has varied widely so far”. I believe that the groundwater sections in the AGL EIS and Yancoal SEP EIS are not adequate.

Cumulative Impacts of Coal Mines and CSG

The Gloucester valley is very different to the Hunter valley. By comparison, it is very narrow and in the Gloucester area and to the south, is well defined by small ranges known as The Bucketts and Mograni. The existing Stratford coal mine is located on the eastern “half” of the approximately north/south valley. The Stage 1 proposals for the both the AGL GGP and Gloucester Resources Rocky Hill mine will also be located in the eastern half of the valley.

You can stand on a small hill on Bucketts Way near Gloucester and look to the south to see the existing Stratford overburden dumps, look straight ahead to what I understand to be the “hub” of the GGP and look to the north to see where the proposed Rocky Hill open-cut will “swallow up” the latest dairy in the district. The proposed GGP will have CSG extraction wells effectively overlying the two mines except of course where there is or will be open-cuts.

As you are no doubt aware, the EIA processes do not handle cumulative impacts at all well. This applies both to projects that overlap as well as the future expansion of individual projects. I have provided some details of my concerns in relation to cumulative impacts of projects and groundwater modelling (for the SEP) in Attachment 1. A considerable amount of the information presented in Attachment 1 also formed part of the submission by the Gloucester Shire Council on Yancoal’s Stratford Extension Project. I am the author of the groundwater section of GSC’s submission to the NSW planning agency.

I recall when EIA was a new and developing area, that the WA EPA Act had overall, a very good process of EIA enshrined in new legislation (1986), but it didn’t include consideration of cumulative impacts. At national conferences where the States were talking about EIA, NSW was “crowing” about how the state had integrated the EIA process with the State planning process.

However, when the officer in charge of the EIA within the NSW planning agency spoke to us last year, he said that they only consider EIA on a project by project basis. Looking at cumulative impacts was not part of his responsibility. We note that the Director General’s Requirements do mention the need for a review of cumulative impacts in some cases. However usually this section of the EIS is handled poorly by proponents from what I have seen.

A major concern is the way that proponents for different projects use different modelling techniques for groundwater and make different assumptions. It is very difficult for anybody really understand the nature and extent of cumulative environmental impacts in the current situation.

The Gloucester Shire Council is calling for an integrated project to model surface and groundwater processes across the 3 coal/coal seam gas mining project in the Gloucester Valley. A draft brief has already been written. I strongly support this proposal. I expect that the proponents will not want to do this and will find a range of reasons why it couldn't be done.

For more information on cumulative impacts, please refer to Attachment 1. It covers mostly technical issues associated with groundwater. I think it strongly supports the need for further consideration of groundwater issues by the Federal government, as the State government processes failed to adequately deal with them.

AGL Gloucester Gas Project

As mentioned above, this project already has conditional approval by the State and Federal Governments. It is my view that neither Government should have approved this project considering the level of doubt over groundwater issues.

I don't really want to get into the politics as I don't think this is part of the current Inquiry's terms of reference. But it is noted that State Government approval was suddenly given about a week before the previous Labour Government went into lock down mode prior to the State election. Maybe the reason for this timely announcement will become clear through the ICAC inquiries.

The Federal Government approval was given around the same time that constraints were applied which would make AGL's planned expansion of the Camden CSG development extremely difficult. Hon Minister Tony Burke, in his media conference to announce conditional approval, stated something to the effect that this approval is different to other Federal approvals under their environmental legislation because there are so many strict conditions that still need to be met by AGL in relation to groundwater modelling.

When the quality of information about groundwater issues in AGL's EIS is considered, this is difficult to understand. It is likely that Mr Burke has other information available to him that the community does not have and therefore cannot comment on. If this is so, this information should also be available to the public.

As recently as Wednesday 10 April, AGL put a full page advertisement in the Gloucester Advocate stating that **"Our water studies are comprehensive, thorough and independently reviewed"**. The advertisement goes on to talk about the "independent peer review" on groundwater by well respected consultant Richard Evans of SKM. The report AGL is referring to is the "Peer Review of Groundwater Studies- Report to Gloucester Community Consultative" on the Gloucester Coal Seam Gas Project, 3 May 2012.

I encourage you to read this report. My view is that Dr Evan's report **is** very good. However rather than support AGL, by anybody's judgement, I believe the report is very highly critical of AGL's groundwater work as report in the EIS. To list some of the problems:

- One of the main objectives of the Parsons Brinckerhoff "Phase 2 Groundwater Investigations" (PB, 2012) report was to "Prepare a comprehensive technical report that includes a revised conceptual model of groundwater" processes. Clearly, Dr Evans does not believe that this has been achieved.
- The conceptual model presented is very simplified and does not meet normal standards for such a model. Dr Evans says that the conceptual model:
 - Is spatially limited – Pells (see reference below) calculates that it encompasses only 0.25% of the project area;
 - Is vertically limited – only covers down to 300-350m (the Figure in PB representing the model only goes down to 250m) while the target coal seams are mainly in the range 200 – 1000m;
 - Does not consider faults or shear zones of which there are many;
 - Lumps all the interburden between 150 to 1000m into one category of material ie assumes uniform lithology, which is not the case;
 - Does not include a preliminary water balance which is a fundamental requirement of conceptual models;
 - Only identifies incoming water paths, not outgoing water paths;
 - Does not define model boundaries to be used for the conceptual model or the detailed numerical model;
 - Does not consider the "nature" (current) conditions versus the developed state ie the situation when the CSG wells are operating and causing a drawdown in pressures;
 - Does not adequately cover rainfall and aquifer recharge processes; and
 - Does not consider the continuity (or more likely the lack of continuity) of coal seams.

And Dr Evans report also states that "in some instances it is considered that the PB (2012) report has:

- drawn the wrong conclusion from the data, or
 - omitted some work/calculations which would improve conceptual understanding".
- All Dr Evans report really concludes is that with an enormous amount of work, AGL should be able to complete a proper conceptual model and then with additional data we understand AGL is currently collecting to meet Dr Evans' recommendations, be able to move on to a detailed numerical model.
 - Dr Evans sums up in Chapter 5, "however it is emphasised that based on the data presented in the PB report, none of these represent criticisms that cannot be readily addressed or the conceptual model revised to take account of the comments. The review has not identified any issues which necessarily indicate the project represents a high or unacceptable risk from a hydrogeological impact perspective – **not that this was the scope of the review, as it is the role of the numerical modelling to assess the location and magnitude of impacts.** (my emphasis)
 - If the role of the EIS is not to "assess the location and magnitude of impacts" what is it? It seems very hard to believe that the State and Federal

Governments would even give conditional approve a project that does not have a tool to properly do this.

- It is unclear what Dr Evans means with the terminology “high or unacceptable risk from a hydrogeological impact perspective”. It may just mean that technically speaking, the gas is present and can be abstracted from the coal seams. It seems implicit that he is not commenting on the risks from the perspective of the magnitude of environmental impacts as he is only reviewing the “.....conceptualisation presented in the PB (2012) report.....”
- On this point Dr Evans concludes that “..... the conceptualisation presented in the PB 2012 report is **broadly** considered to be appropriate, and the **fundamentals** of the conceptual model are **reasonable**.” (my emphasis). Dr Evans has chosen his words carefully. Again, it would appear that Dr Evans does not conclude that the PB report is “comprehensive and thorough”.

The report by academic and consultant Philip Pells “Gloucester CSG Project – Impacts on Groundwater: Review of Aspects of the Phase 2 Report by Parsons Brinkerhoff”, 15 February 2012, is also very critical of AGL’s groundwater assessment. He states that “The PB report includes valuable information..... However, we think the analyses given in this review demonstrates that it is not a comprehensive groundwater investigation.”

I acknowledge that AGL accepts that it is required to do a much more detailed numerical model before final project implementation approval. However the work described above is an important forerunner to that. I also acknowledge that AGL has done a lot more investigation work since the PB report was published.

However from the assessment above, AGL has a very long way to go before they will have a suitable numerical model. We can only assess the situation based on the published information that we have access to and I’m not aware that the essential preliminary stage of having an acceptable conceptual model has been completed yet. We await AGL’s provision of information about this.

Another area of great uncertainty for the GGP is the number and location of the CSG wells. The community has no useful information on this and the amount of groundwater that will be extracted with the gas must also be considered highly uncertain. As well, the community still does not know what AGL will do with it’s “produced water”. A press release I wrote last week refers to this issue; see Attachment 2.

Conclusions

- There is considerable evidence that the information presented relating to groundwater issues in the EIS for the AGL GGP and to a lesser extent, the EIS for Yancoale SEP, with respect to groundwater issues, falls well short of the information required to undertake effective environmental impact assessment;
- For the Gloucester area, cumulative impacts of coal mining and CSG extraction are likely to be significant with respect to their impacts on surface and groundwater but cannot be adequately assessed using the information provided by AGL and Yancoale in their EISs.

- Considering how much uncertainty there is on groundwater issues, it is very difficult to understand how the NSW State and Federal Governments could give conditional approval to Stage 1 of the AGL GGP;
- Current State and Federal legislation does not ensure that groundwater impacts are adequately addressed. Improvements to legislation to ensure that these impacts are properly assessed are urgently required.

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ATTACHMENT 1

Note:

1. A considerable amount of the information presented here also formed part of the submission by the Gloucester Shire Council on Yancoal's Stratford Extension Project. I am the author of the groundwater section of GSC's submission.
2. Yancoal has responded to some of these issues in their Response to Submissions and some changes have been made. However much of their response is considered to be inadequate, as it did not address many of the specific issues raised.

Stratford Extension Project

Major Concerns with Groundwater Modelling

There are major concerns with the approach and technical aspects of the groundwater modelling and therefore with the associated conclusions in the Main Report and Appendix A. These conclusions relate to both the current Yancoal Stratford Extension Project and the cumulative impact of future Yancoal expansions and the cumulative impact associated with AGL's proposed Gloucester Gas Project and the proposed Rocky Hill Coal Mine

Technical Issues Relating to the Groundwater Model:

- 1) Modelling the Gloucester Stroud basin is fraught with difficulties because of the structural complexity of the geology and the relationships between the aquifers;
- 2) The complexity is well known and is illustrated by the intensive exploratory drilling (see Figure in Attachment AD, Enclosure 1 of the EIS at the end of Appendix A, which is a plan showing the location of the huge number of bores drilled during exploration.). This means that groundwater modellers have to make huge oversimplifications about the nature and hydraulic properties of the strata;
- 3) The degree of vertical connection between aquifers is an area of significant disagreement between groundwater consultants. Vertical connection is a critical issue in groundwater modelling with AGL arguing that the connection is minimal. The Yancoal consultants say they agree with AGL on this issue, but they clearly include significant vertical connectivity in their model. In Figure A-25 they also show the coal seams as nearly vertical, which can add significantly to vertical connectivity. As well, no models that we are aware of have even tried to consider the effect of the extensive shearing and faulting;
- 4) Clearly open-cuts up to 180 metres deep provide direct connection between aquifers to that depth. There are also major questions about the quality of construction and Government regulation of the huge number of exploratory bores and AGL's future production bores drilled more recently (with a significant number being fracked) as well as bores drilled since coal exploration started in the 1960s/1970s;

5) The model used for the Yancoal EIS appears to only consider periods of permanent base flow in watercourses as groundwater contours do not drop below streambeds. This is supported by Figure A-25 which shows the model including baseflows in the streams. However, the consultants accept elsewhere that the streams are ephemeral. Critical conditions for say, riverine vegetation and vegetation accessing groundwater when there is no surface water, will be during drought sequences both within and between years and these are not assessed;

6) For impacts by Yancoal alone, no consideration is given to the future expansions of new open-cuts which can certainly be expected both to the north and south (at least);

Groundwater Model Outputs and Conclusions Drawn in EIS including Cumulative Impacts:

Notwithstanding the issues identified above, we have considered the model outputs. The outputs will be particularly affected by the assumption of permanent baseflows in the creeks and the overall vertical and horizontal hydraulic connectivity.

Section A6.1.6 refers to Figures A-57, which shows watertable contours for the project operating alone while Figure A-58 shows watertable contours for all 3 projects operating at the same time at the “end” of the current Yancoal project.

It appears that the maximum watertable drawdown for the project operating alone is around 70 metres in the Stratford East Open Cut. However the open cut will be 180 metres deep. Therefore the watertable at this time should reflect that depth. This anomaly cannot be readily understood.

Figure A-58 shows watertable drawdowns in the order of 170 metres close to Stratford Village. This is presumably partly the result of a concentration of CSG bores in this area. In Section A6.1.8 in the third paragraph it is stated “CSG activity would cause pronounced drawdown in the watertable between the Project and Stratford.” The impact on Stratford bores could be up to 5 metres, not 1-2 metres as stated in the EIS.

In Attachment AD, the Consultant acknowledges that the drawdown for the Stratford project operating alone, will be up to 170 metres in the Stratford East Open Cut when the Layer 11 coal seam is being mined. Why this is different to what is shown in Figure A-57 is unclear.

Attachment AD also contains the most concerning drawdown contours of all for cumulative impacts. The last set of groundwater contours show a maximum drop of about 1700 metres centered just south east of Stratford with huge drawdowns over a very large area. A 1700 metre drawdown in potentiometric head seems ridiculously high since as far as I am aware, no CSG wells will be that deep. However, this is what the document states. Note the assumed “nest” of CSG in this area. In their Response to Submissions, Yancoal has advised that this would be a “worst case scenario”. So far as I’m aware, this was not indicated in the EIS

Although not stated, this is likely to mean continuing drops in the watertable as downward vertical flow is induced. Figure A-58 also shows that drawdowns on the

western side of the area impacted is limited by a roughly north-south line just to the east of Stratford village. This seems very convenient but highly questionable. There is no proper review and discussion of these critical issues in the EIS.

No information about the impacts of such a drawdown is given in the Main EIS Report or Appendix A. Section A6.1.8 just states blandly that “Based on the modelling results, cumulative effects are expected to be substantially greater than would be produced by the Project acting alone” with the Main Report making a similar comment.

Conclusions based on Concerns with Groundwater Modelling:

The veracity of the groundwater modelling used in the Yancoal EIS needs to be reviewed by Government regulators and independent experts;

The cumulative impacts on groundwater of the Yancoal Project, the Rocky Hill project and particularly the AGL gas project, are highly significant. Related impacts on the ecology and other beneficial uses, such as private wells in Stratford, are therefore also potentially highly significant;

The impacts related to the AGL gas project, as presented in this EIS, need to be taken up as part of the final approval process of conditions by Government regulators.

None of the proponents for the Yancoal expansion, the AGL gas project and the Rocky Hill mine, can adequately assess the cumulative impact because they are using different data and different models to suit their own purposes. There needs to be a comprehensive and integrated groundwater modelling study undertaken by an independent steering committee, before any further approvals are given.

Other Groundwater Issues

Complexity of the Hydrogeology

An overarching issue is the complexity of the hydrogeology in the Gloucester – Stroud area. To quote from the NSW Geological Survey’s review of the area in 1991 (ie 22 years ago) as reported by Pell Consulting in February 2012:

“The Gloucester Basin (technically the Stroud Gloucester Syncline) is about 55 km long with a width of 24 km at its widest point. The syncline is a fault-bounded trough; the structure is complex.... Coal seams in the trough are characterised by a considerable degree of lateral splitting, only 6 of the 20 or more seams can be correlated across the syncline. Faulting and folding have significantly reduced the potential for development of these resources.”

Pell’s report goes on to talk about how the groundwater model for the AGL Gloucester Gas Project has had to be greatly simplified because of the complexity of the stratigraphy and the paucity of field data. He also criticises AGL for:

“Concluding that faults play no role in groundwater movement, and do not even displace the stratigraphic units in the model, is contrary to almost all experience in hydrogeology and groundwater engineering.”

Some faults may be able to prevent cross flows from aquifers but certainly not shear zones. Heritage Consulting have had to make similar over-simplifications in their modelling, including not considering faults and shear zones. The main output of groundwater modelling is maps showing drawdown contours for the watertable and/or potentiometric (pressure) heads due to groundwater abstraction. Proper assessment of the impacts of coal and CSG mining due to the pumping of very large quantities of groundwater is dependent on having confidence in the knowledge of the hydrogeology as represented through the groundwater modelling. We have major problems with these aspects of the EIS (as well as the work done by AGL and Rocky Hill) which significantly affects many of the comments on issues below.

The complexity of the hydrogeology is visually illustrated by Enclosure 1 of the EIS at the end of Appendix A, which is a plan showing the location of the huge number of bores drilled during exploration. It shows the immense difficulty the geologists had in unravelling the complex structural geology to assess the coal reserves and allow for mine planning. The advice I have from an experienced geologist who worked in this location, is that he knows of no other exploration programme that has drill holes so close together.

It is further illustrated by the massive investigations undertaken by AGL by drilling bores, testing fracking holes, 2D & 3D geophysical investigations and now a huge aeromagnetic investigation using a blimp. . The same geologist mentioned above has indicated that AGL probably neglected to consider the numerous shear zones in their initial investigations. As a result, they have needed to continually repeat their seismic testing to find blocks that can be drilled without contributing further to the huge cost of their drilling programme.

In conclusion, as stated in Section 8 of our report on Cumulative Impacts, none of the proponents for the Yancoal expansion, the AGL gas project and the Rocky Hill mine, can adequately assess the cumulative impact because they are using different data and different models to suit their own purposes. There needs to be a comprehensive and integrated groundwater modelling study undertaken by an independent steering committee, before any further approvals are made.

Cumulative Impact Related to Incremental Expansion of Stratford Mine:

This issue relates to the incremental expansion of Yancoal’s Stratford Coal Mine (SCM). According to readily available geological mapping of the Gloucester-Stroud Syncline and Gloucester Coal’s Annual Reports, the coal resources that may be mined in the valley are huge. Since the mine commenced in 1995, there have already been many expansions to the project.

Pumping of groundwater flowing into the coal mining open cut pits (that is, dewatering of the pits) to allow for mining activities, requires the extraction of large quantities of groundwater that will flow into the pits as they are excavated. This EIS

only covers the impacts of the existing operation plus the new pits associated with the current expansion. The impacts of the extraction from shallow aquifers and therefore the watertable, together with the pumping from deeper aquifers intersected by pit excavation, will be widespread and is likely to have a significant impact on a range of beneficial uses of groundwater, including impacts on ecosystems which use that groundwater.

Again, it is not possible to properly assess the medium and long term impacts on groundwater when this EIS only covers the latest expansion. We can be sure that part way through the development of this expansion, there will be an application for more pits to the north and south of those currently proposed. Ongoing exploration is very briefly mentioned in Section 2.3 of the EIS. In fact, extensive drilling exploration has already been completed south of Pages Road and north to Fairbairns Road, which will connect up to the Rocky Hill development.

Impact on Dog Trap Creek and Avondale Creek

The EIS states that the open cuts will be placed no closer than 40 metres to the creeks.

This appears to be the plan to avoid any significant impacts from dewatering activities. The groundwater modelling indicates that there will only be small drawdowns in the vicinity of the creeks.

However, this is based on an analysis which appears to assume that average flows will always occur in the creeks, despite the EIS acknowledging that the creeks are ephemeral. During very dry periods, it would be expected that creeks would be dry for long periods with no base flow. Riverine vegetation is likely to be groundwater dependent at these times. Drawdowns due to mine dewatering are likely to cause the water table to drop well below the creek bed. It is difficult to believe that a 200 metre deep pit 40 metres from the creek, will not have a very significant impact on the creek.

This is even more likely when a future pit is excavated to the north as part of future expansions by Yancoal and/or the AGL wellfield is operating. This may have a major impact on the health of riverine vegetation which appears to be in reasonable condition for Dog Trap Creek. If vegetation dies and as proposed, there are periods of increased flows in the creeks due to increased catchment areas, major erosion of the bed and banks can be expected.

ATTACHMENT 2

PRESS RELEASE TO NEWCASTLE HERALD

responding to the article

“Gas company dismisses water quality threat”

Gloucester Advocate, Wednesday, April 10, 2013

The above article reports on AGL’s response to the ABC’s recent Four Corners program on Coal Seam Gas. The Gloucester Environment Group (GEG) has reviewed the comments by AGL in this article and is concerned that there appear to be factual errors in the information as reported.

With respect to water quality in the Avon River, AGL has stated that it is a “known saline catchment”. GEG has been recording electrical conductivity (EC), a measure of salinity, in the river at three points since 2009. The aim was to provide a baseline that can be used to compare changes to salinity and other water quality parameters over time. The sampling site with the highest recorded EC is just to the south of Jacks Road.

With the river flowing, the highest recorded EC is 540 units (micro Siemens per centimetre) with an average over 18 samples between 2009 and 2013 of 355 units. This is a relatively small sample size but I note that Stratford Coal’s data for 2011 for a site not far upstream gives an average EC of 257 units.

The Australian Drinking Water Guidelines set the maximum salinity (measured as total dissolved solids) for fresh domestic drinking water as 500 milligrams per litre which is approximately 770 EC units, well above the recorded EC levels for the river.

The Avon River is therefore not saline but fresh. I acknowledge that there is brackish to saline shallow groundwater in the catchment and that the river has a higher salinity than the Gloucester, Barrington and Manning Rivers. However it is incorrect to describe it as a saline catchment.

The article goes on to state that by discharging their treated “slightly salty” groundwater would “actually improve the quality of the water in the Avon River Catchment”. As indicated above, to improve the salinity of the river, AGL would

need to desalinate the water to better than drinking water standards. The “produced water” is not only saline but also includes many other chemicals that can be a problem in drinking water or in water for ecological purposes.

GEG considers that as a matter of principle, no coal seam gas project, coal mine or any other industrial development, should be given approval to discharge process water into a river system, especially in a catchment used for public and private domestic water supply.

With respect to the impact of the Gas Project on water table levels, GEG is very concerned about the veracity of the modelling done by AGL consultants and the conclusions drawn, including conclusions about the connectivity of shallow and deeper aquifers. We acknowledge that AGL is working on a more detailed numerical model however a necessary step is for AGL to first develop a robust conceptual model, as identified in their “independent peer review” consultant’s report.

GEG strongly supports the proposal by the Gloucester Shire Council for a comprehensive and integrated surface and groundwater modelling study of the Gloucester basin. This study needs to assess the cumulative impacts of the AGL Gas Project, Yancoal’s Stratford coal mine expansion and the Rocky Hill coal mine. No further approvals should be given for any project implementation, including AGL’s Stage 1, until the outcome of this study is known.

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(Retired water resources engineer)

