

Preliminary finding of the peer review of the considered documents that relate to the UPL toxic spill which occurred in KZN, and which resulted in major environmental impacts.

Professor Jason Weeks

This is a provisional finding of the evidence review of in excess of 64 reports and other documentation and following a meeting of specialists that took place on the 11th of October, 2021. In order to move forward expediently (in advance of the full report), I share my preliminary finding.

It is the opinion of the reviewer that based on an overview of the reported evidence (using the methodology described below) that the recommendation to open the beaches around the Umhlanga estuary could be supported for recreational use and surfing. Whilst there remain some uncertainties on the fate of the chemicals released during the spill, subsequent efforts to remediate and remove any ongoing sources of contamination from the site and upper reaches of the tributary appear effective. The recommendation is based on a consideration of the available data with an overall outcome of:

- **Moderate – in that further research is likely to have an important impact on confidence in the estimate of effect and may change the strength of the recommendation.**

The evidence statement has been structured to assist in prioritizing a recommendation. An evidence statement will follow that informs on how the evidence (in terms of strength and applicability) to form a judgement on the overarching quality of the reported information was reached based on weighing the reported evidence and considering the associated measures of uncertainty. Whilst the reviewer agrees that the ongoing risk posed to recreational users is low to negligible, the indication to continue a closed exclusion zone 1 km south and 1 km north of the Umhlanga estuary mouth to such recreational and surfing activities is a sensible conclusion given the uncertainty of the fate of the unaccounted chemicals.

Furthermore, the suggestion to restrict/ prevent harvesting of marine vertebrates or invertebrates from the region should remain in place i.e., all collection is prohibited until the determined levels of toxicity decline or until ongoing chemical/ biological monitoring data indicates a low risk of continuing toxicity. The monitoring is recommended to continue for the foreseeable future until evidence indicates that continuing toxicity of discharges from the estuary is negligible.

The evidence statement for the overall summary of available reports is deemed “Moderate”.

The evidence statement is used as a narrative to provide an overview of the evidence synthesis as a means of bringing together what is known in relation to the incident and address any conceptual or empirical question – “is it safe to reopen the beaches around the Umhlanga Estuary”? This expert review has necessitated a quality and relevance assessment of the various reports and studies associated with informing this decision. In considering how such a decision is reached there is a distinction between the generic judgement of evidence quality according to generally accepted criteria (within that approach to evidence) and a review specific to the evaluation based on the fitness for purpose of the review. A Weight of Evidence approach has helped in pooling the reports that were used in evaluating the evidence by enabling explicit decisions to be made on the consideration of the generic method, a review of the specific method, and a review of the specific focus and context of the report. This approach has been applied to the review of quality and relevance in this appraisal process.

By being explicit about these quality and relevance judgements on the appropriateness of the evidence then allows the empirical decisions to be made.

Methodology adopted for the overview of the reported evidence.

In order to reach a level of confidence in making a recommendation on the decision to reopen the beaches, as reviewer I needed to satisfy myself on the quality of the available evidential reports and the interpretations of the chemical determinations undertaken on a variety of collected environmental samples. In addition to the consideration of the significance of any ongoing ecotoxicity determinations. It was also important to establish a temporal view of what occurred at the time of the incident and the subsequent events and activities thereafter. Moreover, my initial concern was to establish any ongoing risk to both human and environmental health in the immediate vicinity of the site. In order to accomplish this stated task consideration of "all" available evidence needed to be undertaken. This documentation proved to be extensive. Sufficient confidence in the reliability and credibility of the scientific evidence as supplied addressing any concerns on the significance and importance of each specific piece of that evidence in relation to the overall conclusion and recommendation made as a whole were required to be met. The reliability of the evidence including its accuracy, integrity and finally its credibility were considered. The approach adopted is described below.

Reviewing research evidence

Reviewing such scientific evidence is an explicit, systematic and transparent process that can be applied to both quantitative (determined and observational) and qualitative information. The key aim of my review was to provide a summary of the relevant evidence to ensure that the authorities can make a fully informed decision about its recommendations. It was my task to summarize the evidence and its limitations so as to agree or disagree with the current interpretation and make appropriate recommendations, even where there remains uncertainty.

Evidence in the form of reports, and data have been identified and provided from a range of sources. This evidence is itemised (see Annex I) and was both extensive and exhaustive in its breadth and depth of coverage. The most relevant documents containing the most appropriate information to answer the review question were selected and summarised in the full report. The evidence reviews involved 6 main steps:

- Developing a review protocol
- identifying and selecting relevant evidence
- critical appraisal
- extracting and synthesising the results
- assessing quality/certainty in the evidence
- and finally,
- interpreting the results.

Identifying and selecting relevant evidence

The process of selecting relevant evidence is common to all evidence reviews. The same rigour was applied to all data received, as supplied by stakeholders. Care was taken to ensure that multiple reports of the same study were identified and ordered to ensure that data extraction was as complete as possible. A simplified process of evaluating the relevance of an individual piece of evidence/ report was to ensure that each met basic inclusion criteria

(added value to informing the decision). Once screened full versions of the documents were obtained or requested for assessment. Studies that failed to meet the inclusion criteria in terms of relevance once the full version has been checked were excluded at this stage.

The study selection process includes full details of the reason for the inclusion or exclusion of any reported evidence. Each study if excluded after checking the full version is listed in Annex I, along with the reason for its exclusion.

Ensuring relevant records were not missed

The review was based around the consideration solely of the received evidence as recorded in Annex I. All data was quality assessed in the same way as if a published study. Any grey literature was also quality assessed in the same way as published literature, although because of its nature, such an assessment was more difficult.

Assessing quality of evidence: critical appraisal, analysis, and certainty in the findings

Assessing the quality of the evidence required a systematic process of assessing potential biases through considering of both the appropriateness of the study design and the methods undertaken within the study (critical appraisal) as well as the certainty of the findings.

The approach adopted is documented in the full review together with the reasons for the choice. If additional information was needed to complete the quality assessment, this request was communicated.

Critical appraisal of individual reports

Every document was appraised using the following checklist.

Certainty or confidence in the findings of reported information

The certainty or confidence in the report (evidence) findings was considered using the following features for the reported evidence:

- study limitations (risk of bias) – the internal validity of the evidence
- inconsistency – the heterogeneity or variability in the estimates of treatment effect across studies
- indirectness – the extent of differences between the intervention and outcome of interest across reports
- imprecision – the extent to which confidence in the effect estimate is adequate to support a particular decision
- other considerations – bias, the degree of selective use of evidence in the studies.

the following features for the reported evidence were additionally considered for each:

- methodological limitations – the internal validity of the evidence
- relevance – the extent to which the evidence is applicable to the context in the review question
- coherence – the extent of the similarities and differences within the evidence
- adequacy of data – the extent of richness and quantity of the evidence.

Each report included in the evidence review has been critically appraised.

Analysing and considering reported analytical data

Consideration of the appropriateness and quality of the reported information from analytical or toxicity determinations considered the reported analytical methodology, the appropriate use and reporting of standards and the presentation and synthesis of the results from the analytical laboratories.

Analysing results from predictive models

There is currently no general consensus on approaches for synthesising evidence from studies on predictive models e.g., dispersion/ dilution etc. A narrative summary of the quality of the evidence as given, and based on the quality of the criteria as used to inform the model outcome was evaluated.

Analysing results of qualitative evidence

Qualitative evidence as assessed occurs in different forms or formats necessitating different methods for synthesis. A narrative summary was considered sufficiently adequate.

Evidence statements have not been considered for qualitative reports as the synthesis of qualitative data as such do not report on the impact of an intervention or decision on outcomes. Instead, if such evidence is commented upon it will be based on a summary of the evidence, its context and quality, and the consistency of key findings and themes across such reports.

The certainty or confidence of the reported evidence

The certainty or confidence of the reported evidence has been classified as high, moderate, low or very low. The contextual setting for this, can be interpreted as follows:

- **High** – further research is very unlikely to change the recommendation.
- **Moderate** – further research is likely to have an important impact on confidence in the estimate of effect and may change the strength of the recommendation.
- **Low** – further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the recommendation.
- **Very low** – any estimate of effect is very uncertain and further research will probably change the recommendation.

Summary of the evidence

A short summary narrative of the evidence is reported in Annex I; this annex also identifies and describes any gaps in the evidence. A final evidence statement is also provided as an aggregated summary of all of the relevant reports, regardless of their findings. This considers the balance of the evidence, and its strength (quality, quantity and consistency, and applicability). The evidence statement summarises the key aspects of the reported information but also highlights where there is a lack of evidence (note that this is different to evidence for a lack of effect).

The evidence statement is structured to assist in prioritising the recommendation. The statement informs whether or not there is sufficient evidence (in terms of strength and applicability) to form a judgement on the overarching quality of the reported information as to;

- whether (on balance) the evidence demonstrates that a decision, is likely to be effective or ineffective, or is inconclusive

- the size and likely effect and associated measure of uncertainty

The evidence statements for each report include summary information about the:

- content of the report, key findings (for example, what, how much, where?) and comparisons, or factors of interest
- number of samples analysed, and setting(s) (for example, location)
- outcome(s), effect (or correlation) and the size of effect (or correlation) if applicable
- strength of evidence (reflecting on the appropriateness of the study design to answer the question and the quality, quantity and consistency of evidence)
- applicability to the question, people likely affected by the incident or decision.

The evidence statement will also summarise when relevant information about:

- whether the intervention has delivered
- what affects the intervention achieving the desired outcome.

Additionally, where there is no evidence identified for a critical or important outcome such is also included using the following criteria:

No evidence (Note that no evidence is not the same as evidence of no effect.)

Weak evidence.

Moderate evidence.

Strong evidence.

These terms have been used consistently in the review and their definitions reported.

Weight of Evidence

The evidence statement is used as a narrative to provide an overview of the evidence synthesis as a means of bringing together what is known in relation to the incident and address any conceptual or empirical question – “is it safe to reopen the beaches around the Umhlanga Estuary”? This expert review has necessitated a quality and relevance assessment of the various reports and studies associated with informing this decision. In considering how such a decision is reached there is a distinction between the generic judgement of evidence quality according to generally accepted criteria (within that approach to evidence) and a review specific to the evaluation based on the fitness for purpose of the review. A Weight of Evidence approach has helped in pooling the reports that are being used in evaluating evidence by enabling explicit decisions to be made on the consideration of the generic method, a review of the specific method, and a review of the specific focus and context of the report. This approach has been applied to the review of quality and relevance in this appraisal process. By being explicit about these quality and relevance judgements on the appropriateness of the evidence then allows the empirical decisions to be made.