# A study on the ground water pollution and trace metals due to industrial area in Visakhapatnam city

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**Abstract - In this paper the ground water potential zones have been identified in Visakhapatnam city. The ground water quality studies and pollution zonation  map indicates that HZL, AF, HPCl, and CF have polluted the areas Mulagada, sriharipuram, natayyapalem, malkapuram and kopparada where as the area venkatapuram and gopalapatnam are polluted due to Hindustan polymers.**

**Keywords - potential zone, ground water quality, pollution zonation map**
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## Introduction

In this study ground water potential zones have been identified in Visakhapatnam city and surrounding areas basing on lithology and lineament alignments, depth of well, water table fluctuations, well density and aquifer the area of the present study has been categorized into following zones as

Wells in these plain areas are predominantly showing very shallow to moderate depth of water table, while the wells confined to hilly terrines are more of moderately deep to deeper water table levels

Lineaments are found to have in impact on the ground water occurrence and ground water table configuration and fluctuation

The lithology has played a major role in the ground water conditions and also the quality.

*Excellent ground water potential zones*

This zone is associated with highly weathered khondalite with high density lineaments area Hydro geologically deeply weathered pediment with gentle slope with high vegetation and irrigated land use pattern

*Very good ground water potential zones*

The zone is a mainly delineated in deeply weathered pediment to moderately weathered zone alluvial plain areas in this area lineaments are of very high density, which play major role in developing the secondary porosity having very ground water condition

*Good ground water potential zones*

This zone is found mainly in moderately weathered pediment zone, supported by presence of lineaments the rock types are khadalite of highly weathered nature

*Moderate ground water potential zones*

This zone is mainly confined to areas having minor lineament and shallow weathered pediment zone

*Poor to moderate ground water potential zones*

This zone is existing where the hill slopes and pediment zone area with this layer of weathered zone

*Poor to nil ground water potential zones*

The zone, which purely confined to the hilly region having poor to nil ground water sources

## Need of study

Though the industrial zone contributed different salts to the ground water the impact can be directly assessed using the trace elemental concentrations as indicators. Hence, trace metals like Zn and Fe are considered as the important components in such kind of mineralization, all the wells with reference to their distance from industrial zone have been categorized into three zones they are

1. Zone-1 = rear industrial zone
2. Zone-2=far from industrial zone and
3. Zone-3= very far from industrial zone

The ground water quality studies and pollution zonation map indicate that HZL, AF, HPCl, and CF have polluted the areas Mulagada, sriharipuram, natayyapalem, malkapuram and kopparada where as the area venkatapuram and gopalapatnam are polluted due to Hindustan polymers. The area old than far way the chemical industries, the pollution may be due to the sources of the contamination poor sewage system organic wastes and sea water intrusion

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For determining the trace elemental concentration and ground water quality in the study area, statistical approach has been adopted, in this, the trace elemental concentrations of all the identified wells were correlated with the following parametric ratio's namely

PH/TDS, EC/TDS, HAR/TDS, Ca/YDS, Cl/TDS, So4/TDS, No3/TDS, HAR/Cl, HAR/So4, Ca/So4, Ca/Cl, EC/Ca, pH/No3, EC/HAR, Cl/No3, EC/So4, EC/Cl and pH/So4.

The main objective of the exercise is to identify the directin along with the trace elements and other quality parameters have been migrated into the ground water.

In other words, this is to establish the sources of pollutants and their migratory a venue table 1.1 presents the correlation coefficient value between the trace element concentration and the parametric ratio's

Table1. 1

Correlation coefficient values

(Chemical parametric ratio Vs Trace elements)

| Parameters | Fe | Zn |
|---|---|---|
| pH/TDS | 0.010348 | -0.133799 |
| EC/TDS | -0.032393 | -0.214182 |
| HAR/TDS | 0.126374 | -0.02047 |
| Ca/TDS | -0.04239 | -0.02047 |
| Cl/TDS | 0.158995 | 0.023172 |
| No3/TDS | 0.233739 | -0.061553 |
| HAR/Cl | 0.016844 | 0.054765 |
| HAR/So4 | 0.31955 | 0.002242 |
| Ca/So4 | 0.010066 | 0.098909 |
| Ca/Cl | -0.138448 | 0.010686 |
| EC/Ca | -0.14648 | 0.02223 |
| pH/No3 | -0.039541 | -0.034453 |
| EC/HAR | 0.018239 | -0.131381 |
| Cl/No3 | -0.141191 | -0.083299 |
| EC/So4 | -0.170633 | 0.003113 |
| EC/Cl | -0.163 | -0.56745 |
| pH/So4 | -0.014888 | -0.045622 |

The positive correlation with the ratio of So4/TDS indicate that, more the So4 content in the water, the higher the concentration of the metals, this is more natural as all the trace elements are the products of the dissolution of sulphide minerals which are abundant in the study area, their negative correlation with TDS indicate that the waters which are rich in TDS are unable to keep these metals in solution.

**Conclusion**

Significant and positive correlation has been observed between trace elemental concentrations with the parametric ratio namely So4/TDS indicating the occurrence of other metals in these ground waters. Field information and pollution zone map indicates the sources for pollution of ground water is chemical industries which are situated in southern side and NorthWestern side. The quality data strongly suggest that the pH has very high influence on the concentration certain chemical elements and depletion of certain other elements.

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