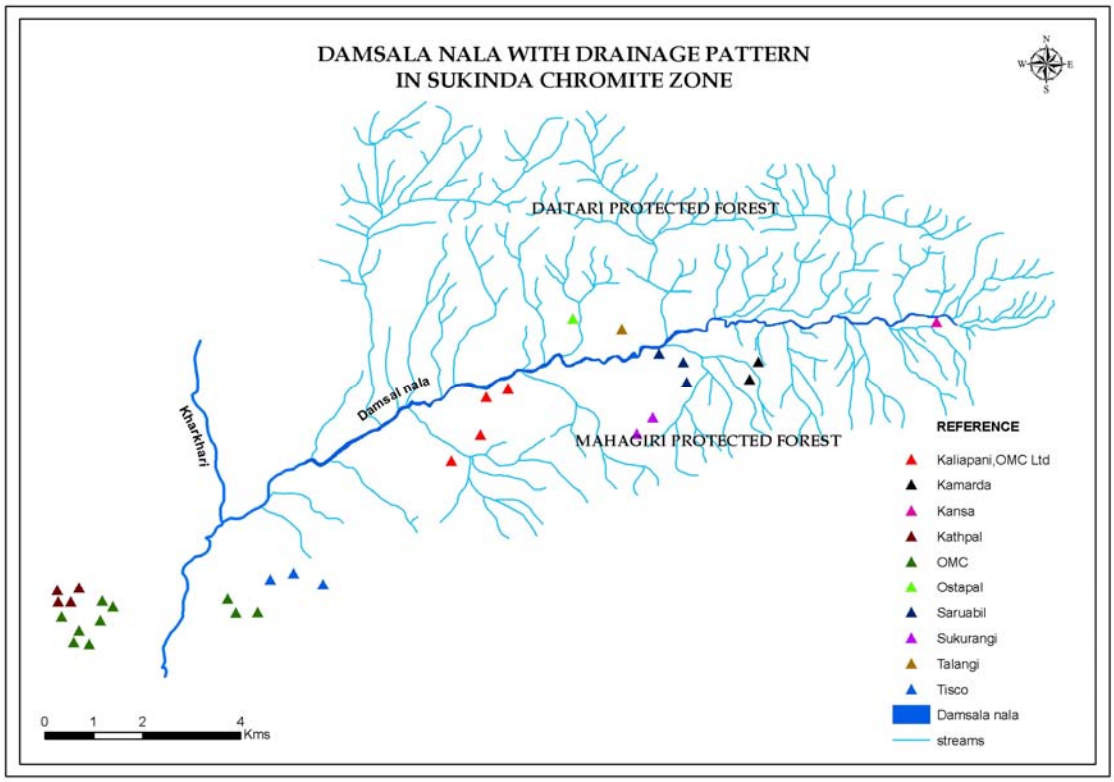
# A REPORT ON
# THE WATER QUALITY WITH REGARDS TO PRESENCE OF HEXA-VALENT CHROMIUM IN DAMSALA NALA OF SUKINDA MINING AREA

**Prepared by- Epgorissa.**

**BACKGROUND OF THE STUDY:** The major cause behind selecting Damsala nala for the present study was for its past cause of concerns for millions who are directly or indirectly came in contact with the nala or are having their dependency on River Brahmani. It was in the year 2007, when UK based Blacksmith Institute came out with a report taking different parameters and based on that they selected Ten **Worst Polluted Areas in the World,** where India had two places ,among which Sukinda was one of them. For next few months allegations and counter allegations took the front page of all leading print as well as electronic medium and a stage was attained where state govt. was serious about banning the organisation and started consultation to sue it in the court of law. But nothing of that sort did ever happened and in due course it was made a low profile affair by the authorities. A report was carried out by Orissa pollution control board (OSPCB) which was prepared in an attempt to show that all is well in sukinda chromite valley. How-ever several inspection reports made by the regulatory authority itself shows that hexa-valent chromium is still a major problem in this area. **EPG Orissa**, an environmental watchdog group committed for a better environment took interest to find out the real truth behind the whole issue by carrying out an independent study . This was followed by going through voluminous materials of about 800 pages of inspection report made by state pollution control board under RTI. A huge amount of discrepancies were marked in the report which corroborated the findings of epgorissa. To find out truth behind all those records field studies were made in different seasons and samples were collected, tested and results obtained. Even a report made by the pollution control board on the health status of the mines had been attached for reference, which itself shows the gravity of the situation at sukinda valley. Even though this Mining is going for more than last half century not a single status of stream, water flow is made available till date, which itself talks about the sincerity of the local govt. as well as of these mining giants. Through this study, we have tried out to bring the truths in a scientific manner along with inputs from the inspection report of state pollution control board.

Objective of the study:

1- **To bring out the actual pollution status of damsala nala (the only drainage system of the area) from hexavalent chromium point of view.**
2- **To highlights the findings of the state pollution control boards various key observations related to hexavalent chromium in the area.**
3- **To give certain mitigatory measures to address the chromium pollution.**




**INTRODUCTION**

The presence of heavy metals such as Cr(VI), Fe, Cu and Zn in high concentration in groundwater can cause an adverse effect on human health and making that water non potable (Dhakate et al 2008). The Sukinda Chromites Valley, in Jajpur district, Orissa is well known for its extensive chromites ore deposits. This valley is considered as one of the richest chromites and nickel producing areas and supplies 90% of India's demand. The area is covered with ultramafic rock of chromites bearing minerals. Presently there are 14 chromite mines operating in Sukinda. Out of these, one mine, Mahagiri Chromite Mines (IMFA) has started its operation of mining lumpy chromite, recently at the foot hills of the Mahagiri hill range.

In this area several mines are in operation for extraction of chromites ore through open cast mining methods. The chromites ores and waste rock material are dumped in the open ground without considering its impact on the environment. Leaching of heavy metals is possible during the rainy season to the surface water bodies as well as to the groundwater systems. The ultramafic rocks in the area are highly weathered and metamorphosed at places giving the lateritic soil cover up to a depth of more than 20 m. Several authors have studied the spatial distribution of heavy metal concentration in soil by statistical relationship between soil properties and soil use or derived a model for heavy metal behavior in soil, subsoil and plant compartment.

**THE DAMSALA NALA**

The study area (Damsala Nala) lies between latitude 21° 1′ to 21° 4′ N and longitude 85° 45′ to 85° 48′ E and is a part of famous Sukinda Valley, Jajpur district, Orissa shown in Figure 1. The drainage in the area is towards Northwest and finally join Damsala Nala flowing NE-SW and the stream is perennial in nature. In the southern part, Mahagiri Hill ranges lies with an altitude of 300 m above mean sea level, whereas Damsala Nala lies between 100 to 180 m above mean sea level. The average rainfall of the area is around 2400 mm/year. The Damsala rivulet crosses the mining belt along the length. This being the main source of water (at least during the earlier days), settlements and villages has developed around this rivulet. Damsala, carries the mine drainage water from almost all the mines. Around twenty perennial springs has originated from the Daitari protected forest area and joined the Damsala whereas around 18 number of springs has originated from the Mahagiri R.F area and finally joined the streams ( source: Topo sheet no **F45N12 & F45 N16**). It has been found out that maximum of mines are located on the south portion of the stream towards the mahagiri R.F. Starting from Kansa to TISCO mining site, all most all mining effluents falls in to Damsala nala at one or other point. Finally the nala falls in to the River Brahmani by Joining Kharkhari Nala.

**GEOLOGICAL BACKGROUND OF STUDY AREA:** Chromite deposits in Sukinda area are mainly associated with ultramafic rocks – dunite, peridotite and pyroxenite of pre-Cambrian age. Chromites minerals consist of primarily of iron and chromium oxides. In addition to these, magnesium and aluminum are also present. The area with chromite deposits has an elevation ranging between 166 - 208 m above mean sea level. These ultramaficrocks are characterized by having fairly thick chromite seams of 10 - 50 m. The chromite deposits form a part of famous chromite bearing ultramafic complex of Sukinda Valley. These ultramafic are highly metamorphosed and belong to Precambrian age. The ultramafic appear to have intruded into the quartzite and this layered laccolithic complex is composed of alternate bands of chromite, dunite, periodtite and orthopyroxenite, repeated in a rhythmic fashion. These ultramafic rocks are extensively lateralized and limonitised. The occurrence of numerous chert bands are also found within the ultramafic, which are often completely weathered to a mass of talc-limonite.

**HYDROGEOLOGY OF SUKINDA AREA:**

The weathered Lateritised – Limonite mantle, ultramafics, orthopyroxenite as well as the underlying semi-weathered and fractured country rocks forms the source of groundwater in the area. The groundwater occurrence depends on the nature, extension and weathering characteristics of the rock formation. The variation in lithology

and structural set up control the groundwater potential and movement. The groundwater in the area is generally under semi-confined to confined condition.

Broadly the major hydro geological units occur in the area is as follows:

**Laterite–Limonite–Chert:** These are the altered production of ultramafics, the degree of weathering and meta-morphism is so pronounced that they are almost obliterated down to a depth of 170 m giving rise to a limonite-chert residual. These are the most extensive and potential aquifers and occur in the eastern part of the area.

**Laterite–weathered and fractured ultramafics associated with limonite and chert:** This formation occurs in the central and west central parts and covers almost the entire mining tract in the Sukinda valley. These formations lie below a thin and discontinuous capping of the soil and lateritic mantle, which persists up to 20 m. The extent of weathering in this formation is comparatively less than the laterite–limonite–chert formation. The groundwater occurs in this formation under phreatic condition up to a depth of 20 - 25 m below ground level. The deeper aquifer in this formation is constituted by the weathered– semi weathered and fractured ultramafics generally remains in hydraulic continuity with top aquifer and groundwater generally exists in these deeper horizons near to water table conditions.

**Colluvial and channel fill deposits:** These formations are generally mixture of boulders, gravels, pebbles, granules etc., highly cemented with ferruginous and siliceous matrix and have restricted occurrences in the foot hill of Mahagiri and Daitri Hill ranges region and along the course of Damsala Nala. The average seasonal fluctuation of water level in this formation is around 4 m.

**Other hydro-geological units including orthopyroxenites:** This group of formations includes orthopyroxenites occurring in the central part around Purnapani village. These formations except the orthopyroxenites are comparatively less weathered and maximum thickness of weathering is up to 15 m below ground level. It can be seen that most of the groundwater flow in the area was westward. In the northern part, the flow was towards Damsala Nala, whereas in the northwestern part the Damsala Nala water seemed to flow in the aquifer towards the village Chirigunia.

**WATER & SEDIMENT QUALITY ANALYSIS IN THE MINES SURROUNDING AREA:**

Water samples were collected from various points (where mining effluents is discharged) of Damsala Nala for pre & post monsoon period and analyzed to study the quality of water with special reference to concentration of Cr(VI). Concentration of Cr(VI) exceeding the permissible limits was detected in various samples collected from Damsala nala, which proves that the chromium pollution is still existing in the chromite valley. Similarly sediments from the Nala was collected and tested and the results show high concentration of hexavalent chromium in the samples.

**METHODOLOGY OF TESTING:**

The method for estimation of Chromite followed in this case was oxidized method, where chromium was oxidized to chromate by permanganate. Chromate forms a Violet complex with addition of diphenyl carbazide.

Water samples: 25 ml of the filter sample was taken to which 10 ml of dilute sulfuruic acid was added followed by 0.4 ml of phosphoric acid and 4 ml of diphenyl carbazide and the solution was made up to 50 ml mark. The optical density of the solution was read at 540 nm with 10mm cell by using spectro-photometer.

Soil samples: 25 ml of soil samples was added with 0.1 ml of sodium sulphide and 2 ml of sulphuric acid was added to soil samples which was further added with 10 ml of saturated oxalate solution and neutralized with ammonia solution. To this 10 ml of dilute sulfuruic acid was added followed by 0.4 ml of phosphoric acid and 4 ml of diphenyl carbazide and the solution was made up to 50 ml mark. The optical density of the solution was read at 540 nm with 10mm cell by using spectro-photometer.

**SAMPLING SITES:** There are 13 chromite mines operating in the zone, out of which 12 are open cast and one is underground type. The main purpose of conducting this study was to find out the degree of pollution level in the Damsala nala with hexavalent chromium. Samples were collected from 5 different sites during both pre and post monsoon period.

The **first sample** of both sediment & water were collected from a considerably non affected area located between Kansa & Kamarda mines.

The **second site** was selected in between Kamarda & south kaliapani, one of the areas where maximum numbers of active mines are located. Samples were collected in both pre-monsoon and post monsoon.

The **third sampling station** was located on the opposite site of TISCO & IMFA mining area. Only water samples were collected from the site.

The **fourth sample** was collected near to Kamarda open mines. Both sediment & water samples were collected from the site.

The **fifth sample** was collected from Saruabil near to the workers colony where the effluents from the mining site falls in to Damsala nala .Both sediment & water samples were collected from the site.

**RESULTS & ANALYSIS OF THE SAMPLES FROM DAMSALA NALA**

| | | **WATER ANALYSIS** | | | | | **SEDIMENT ANALYSIS** | |
|---|---|---|---|---|---|---|---|---|
| Sampling sites | Pre-monsoonal Hexavalent chromium contents in mg/l | Number of times higher than permissible limits | Post - monsoonal Hexavalent chromium contents in mg/l | Number of times higher than permissible limits | Pre-monsoonal Hexavalent chromium contents in mg/l | Number of times higher than permissible limits | Post-monsoonal Hexavalent chromium contents in mg/l | Number of times higher than permissible limits |
| **SITE-1** | **5.0** | **50** | **4.0** | **40** | **31.0** | **310** | **47.0** | **470** |
| **SITE-2** | **16** | **160** | **04** | **40** | **65** | **650** | **86** | **860** |
| **SITE-3** | **11** | **110** | **05** | **50** | ***0** | **0** | **0*** | **0** |
| **SITE-4** | **13** | **130** | **02** | **20** | **42** | **420** | **58** | **580** |
| **SITE-5** | **15** | **150** | **05** | **50** | **46** | **460** | **71** | **710** |

*- Sample not collected

**ANALYSIS**

Analysis of the samples revealed that the percentage of Cr+6 is found in both the pre & post monsoon in higher amount. The post monsoon chromium content is found to be low in water as dilution occurs due to rain. However in case of soil samples the value is found to higher than pre monsoon as leachates from overburdens spreads on the bed.

By following the standard method of sample collection and test with the method written above, the water sample collected from the first site (pre monsoon) was found with **05mg/l** of chromium and that of the soil sample collected from the same site contains **047mg/l** of chromium, which is a quite high amount. The samples collected during pre monsoon at same sites shows high concentration of chromium content as compare to post monsoon.

Similarly the samples analysis of site 2 in both pre and post monsoon reveals higher percentage of chromium . The chromium value is found to higher in soil during post monsoon where as the value in water is found to be high in pre-monsoon.

Whereas the water sample collected from site no -3 when tested was found to be with **11mg/l** hexa valent chromium in it. This is found to be- times higher than the standard value of 0.05 ppm as prescribed by APHA.

In case of soil and water samples collected from sampling site-4 when treated was found with higher percentage of Hexa valent Chromium in water during pre monsoon but was higher in post monsoon in case of soil samples.

And in case of sample site -5 the amount was little higher than that of sample -4 but followed the same trend where pre monsoonal water sample and post monsoonal soil carries more Cr+6 than other season.

**FINDINGS REGARDING HEXA-VALENT CHROMIUM CONTENT IN SUKINDA AREA** (as mentioned in Orissa State Pollution Control Board report)

A glossary through the inspection reports of state pollution control board of various chromite mines in Sukinda valley reveals the presence of Hexa-valent chromium in the Damsala nala in much above than the permissible limits. The details of the analysis are hereby attached to this study in **annexure-I** for ready reference. This finding clearly states that the soil, ground water and surface water of sukinda valley is already polluted with hexa-valent chromium, a carcinogenic element. This study conducted by epgorissa also finds that Hexavalent chromium is a major problem in sukinda area. It has been found that tones of chromium are added to the environment of Sukinda both through polluted air and water from various mines. However it is an irony that the pollution control board reports always tries to denounce the findings of presence of excess chromium in the environment. The state pollution control board report "REPORT ON ENVIRONMENTAL ISSUES OF CHROMITE MINING IN SUKINDA VALLEY" has tried hard to defend the pollution problem in Sukinda valley. However the inspection report made by the same agency says the other part of the story.

The State Pollution Control Board, Orissa, *inter-alia*, submitted that the water of the Brahmani river, which is the second largest river of Orissa and flows through the districts of Sundargarh, Angul, Deogarh, Dhenkanal, Jajpur and Kendrapada before meeting the Bay of Bengal, is predominantly used as drinking water source after treatment and disinfection. In Sukinda Valley, a small stream called Damasala Nallah flows down to river Brahmani. Sukinda Valley area is a rich repository of chromite ore. Therefore, the water of the Damasala Nallah contains high level of hexavalent chromium. There are 13 mines operating in Sukinda Valley area. Out of that, 9 mines discharge their mine drainage water, which ultimately goes to river Damasala. Mine drainage water of one of the mines does not contain hexavalent chromium in excess of standard. As per the Board's direction all the remaining mines have already installed adequate treatment system to treat the mine water, so that, the hexavalent chromium remains within the prescribed standards. The water quality of Damasala Nallah and its impact on river Brahmani is being studied by the State Pollution Control Board. From the study made so far, it is found that the hexavalent chromium in river Brahmani at the up-stream of confluence point of the Damasala Nallah was 0.006 mg/l and at the down-stream it is 0.012 mg/l. The standard of hexavalent chromium for drinking water is 0.05 mg/l. Therefore, the study suggests that river water of river Brahmani is not affected significantly due to hexavalent chromium and remains within the norm.

**FAMOUS CASES AND EFFECTS IN OTHER PART OF THE GLOBE DUE TO CHROMITE**


**The Case**

Erin Brockovich-Ellis (born June 22, 1960) is an American legal clerk and environmental activist who, despite the lack of a formal law school education, was instrumental in constructing a case against the Pacific Gas and Electric Company (PG&E) of California in 1993.Tests of tap water at 110 Los Angeles County government facilities showed levels of chromium 6 at up to 8 parts per billion--more than 40 times the suggested limit, Chromium 6, a byproduct of metal-plating and other industrial activities, is classified as a carcinogen when inhaled as particles or fumes. The state's current standard for total chromium is 50 ppb, and the federal standard is 100 ppb."We continue to support the total chromium standard of 100 parts per billion for safe water,"

**The Verdict**

More than 600 residents of Hinkley, CA, sued Pacific Gas & Electric (PG&E) for injuries resulting from PG&E's alleged contamination of the groundwater with chromium wastes from a generating facility. After a two-year trial, PG&E settled for more than $330 million.

**Positive use of Chromium health sector**

This results of 15 controlled studies supplementing defined Cr (III) compounds to subjects with impaired glucose tolerance. Three of these produced no beneficial effects while the remaining 12 interventions improved the efficiency of insulin or the blood lipid profile of subjects (ranging from malnourished children and healthy middle-aged individuals to insulin-requiring diabetics). Its complete structural identification is a major challenge to chromium research Future research along these lines might establish whether chromium deficiency is a factor in the much discussed "Syndrome X" of insulin resistance.

**Commercial usage**

Chromium has been used commercially for more than 100 years in metal alloys and other compounds, as a pigment, and in the tanning and metal plating industries, and many studies have looked at its effects in terms of occupational health. But, although scientists know that Cr (VI) is a human carcinogen and that it can cause other deleterious health effects including kidney and liver damage, certain questions remain about the metal's effects, such as which routes of exposures are dangerous for humans.

**The Carcinogenic effects**

The toxicity and carcinogenicity of hexavalent chromium (Cr) in animal and human models are reviewed. The focus of this review is not on the well-established fact that hexavalent Cr compounds of low and high water solubility can induce respiratory cancers, but rather this review addresses other types of cancers induced by exposure to hexavalent Cr compounds. Additionally, non-cancer endpoints are also discussed with documentation of human and animal studies showing non-cancer health effects of hexavalent Cr exposure on the respiratory system, GI system, immune system, liver, and kidney. There is an emerging understanding that because hexavalent chromate is isostructural with phosphate and sulfate, it is readily taken up by the G.I. tract and penetrates to many tissues and organs throughout the body. This is supported by animal studies and experiments using human volunteers. From the epidemiological studies, there is suggestive evidence that hexavalent Cr causes increased risk of bone, prostate, lymphomas, Hodgkins, leukemia, stomach, genital, renal, and bladder cancer, reflecting the ability of hexavalent chromate to penetrate all tissues in the body. A high accumulation of Cr (III) in all tissues and organs is a strong indication of the wide toxic potential of exposure to soluble hexavalent Cr in the drinking water and in the ambient environment.

Cr(VI) is a human carcinogen following inhalation of high concentrations. It can also cause allergic contact dermatitis. The uptake of Cr(VI) via dermal absorption from contact with surface soil and building wall surfaces, as well as inhalation, was also evaluated. The techniques used in this assessment are applicable for evaluating the human health risks posed by any residential site having contaminated soil. The potential for both sensitized and unsensitized persons to develop allergic contact dermatitis due to exposure to soil contaminated at these levels was found to be negligible. These levels of risk have always been considered well below those that warrant regulatory concern. For persons living on residential properties, the cancer risk due to inhaling suspended particles is likely to be less than 1 in 1,000,000 if Cr (VI) levels in soil are less than 180 mg/kg (ppm).

## CONCLUSION:

### RECOMMENDATION AND SUGGESTIONS

There are few immediate steps need to be taken on priority basis as this whole pollution at this chromites Hub is having a effect on a large area as it is one of the Major source of second largest River system of the state i.e. River Brahmani. And it is after Jenapur after passing through Kalinga Industrial Area it is the major source of Irrigation for cultivation till it reaches the Bay of Bengal in the Bhitarkanika Delta.

It has been seen in case of a chromites washery at Budhakendua in Jajpur district, where with contamination of soil around the washery has gone in to the food grain and was found when tested. So it is a eye opener for all of us to be more careful in case of Damsala Nala as any contamination goes into it from mines can have a effect on the whole population of the state as paddy is a major cultivated item along the river and it caters the of the state .

As there are many perennial streams originate from Sukinda Hill Range and some of them are used for beneficiation and other mining related purposes, a compilation of all the streams with their geographical location and usability can help in planning a method to safe guarding from chromium contamination. So also it will be easier to pin point the streams that needs to be treated before released in to Damsala nala. It will help in fixing responsibility with the individual organisation to maintain the standard of streams.

**REFERENCES**


1. Report on Environmental issues of chromite mining in sukinda valley, prepared by Orissa state pollution control Board.
2. State of Environment: Chromite Mining & Related issues, prepared by Envis News letter, May-July 06, Vol-5, No-01.
3. Economics of Mining in Orissa, Dr.L.N.Dash, Orissa review, Novermber,2007.
4. Data obtained under RTI, Department of mines, Government of Orissa.
5. Valley of despair , Satyasundar Barik ,Down to Earth, April 30th issue,2007
6. http://www.ospcboard.org
7. http://www.ospcboard.org/Download/Environmental_Issue_of_Sukinda_Valley.pdf
8. "Save Brahmani", News Letter of district Industrial Pollution Control& Citizens Action Project, Dhenkanal, Angul.
9. Quarterly Newsletter, ISSN 0971-9148, special Issue, State Pollution Control Board, Orissa
10. file:///C:/Documents%20and%20Settings/Administrator/Desktop/Sukinda%20cancer.htm
11. file:///C:/Documents%20and%20Settings/Administrator/Desktop/cancer%20patient.htm
12. http://en.wikipedia.org/wiki/Erin_Brockovich
13. http://www.freedrinkingwater.com/water-news/water-pollution-chromium-la.htm
14. http://pubs.acs.org/subscribe/archive/tcaw/10/i04/html/TCAW04pers.html
15. http://jn.nutrition.org/cgi/content/abstract/123/4/626
16. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2556938/
17. http://www.informaworld.com/smpp/content~db=all~content=a793714693
18. http://www.informaworld.com/smpp/content~db=all~content=a916069130

***Annexure I***

## STATUS OF HEXAVALENT CHROMIUM IN SUKINDA (Based on RTI information)

**Back ground of this study:** After the infamous Blacksmith rating sukinda as one of the most polluted site (among top 10 site of world), the Orissa state pollution control board has countered the Blacksmith report. In their counter, it has been found out that, the blacksmith report is based on mere assumption). After publishing this counter file, blacksmith did not give any clarification.

In this background, information's such as inspection report of board scientist of all the mines were collected to find out the real scenario. The findings of these information's are quite horrible. It proofs that Hexavalent chromium is found in high amount in environment of sukinda .

**Information collected:**

1. **The inspection report of state pollution control board**
2. **The report of the project "assessment of hexavalent chromium in sukinda" made by SPCB, funded by MoEF.**

### Findings of the RTI data ( mines wise)

### Ostopal Chromite Mines

**Name of authority:** P.C.Routa

**Letter No:**

1. Cr+6 is 10 times higher than prescribed permissible limit in Damsala Nalla .
2. ETP was defunct and mine drainage water along with COB trailing pond over flow was directly discharge to Damsala nala.
3. Over burden management was very poor helping in dispersal through dry wind in dry seasons.
4. Reclamation of trailing pond effluent is done very poorly giving rise to apprehension of contamination of ground water with Cr +6.
5. Chrome ore and Chrome concentrate storage being done in open yard without runoff management and dust suppression giving rise to chance of spreading.
6. Poor sprinkling of water facilities with no permanent system available till now.

Water tested on 16\11\07 shows that the concentration of hexavalent chromium in Ostapal untreated mine drainage found at 1.030. The tube well water from Saurabil village , which was donated by Saurabil Mines is having 0.165 mg per litre, which is higher than permissible limits. It is a clear proof that the ground of the area is already contaminated. This water are coming from a depth of 250 -350 feet which clearly supports the view that the ground water is contaminated by hexavalent chromium since long.

The environment records dated 3rd sept.07 at this mines shows that the hexavalent chromium of flowing water of this mine was 0.46 ppm( found in inlet to ETP) ,but the content of Chromium in outlet of ETP was not tested By SPCB.

The chromite content in mine drainage system was found at 1.030 in 2007. But is it a planned overlooking of the test or may be because they could have stand as an obstruction in the way of mining, such a lame excuse in the form of (ND) is given, which after two years in 2007 was found. So is it not the responsibility of the government to penalize those officers (P.C.Routa) who allows such high contamination to go on creating a life threatening situation with its effects for thousands of people living in and around that area.

**Air pollution**

The air pollution test that was conducted at Ostopal Chromite Mines (near dispensary) which is a sensitive area shows the SPM value at 130 ug/m3. The standard for this area should be 100 ug/m3. No complain or action in this regard was mentioned anywhere in this report??????

The survey made on water samples on September, 2004 shows Cr+6 amount was found 8times higher than permitted limits in mining drainage as well as trailing pond. No action or even a notice in this regard was never issued to the concerned mining company.
Date-19/3/07

**Area-Tailangi Chromite Mines**

**Inspection officer:** S K Prusty.E.S, Sri P K Kar ,A.E.E.

1. Tailing pond discharged to Damsala nala after ETP is having Cr+6 at a staggering high of 1.49mg/l, which around 15 times higher than permissible limits.
2. Mine water discharged from quarry no 1 to Damsala River is 0.4386 mg/l, which is more than four times higher than permissible limits.
    - In Tailangi chromite mines, water tested on 22/6/06 at quarry no 1 to River shows Cr+6 level at 0.69mg/l . It is 7 times higher than the permissible.
    - Quarry no 2 to River shows cr +6 at 0.32mg/l of which about 3 times higher than limits.

Again in 22/9/07 the same place was taken for check on a regular fashion and report of the result was submitted , where results for mine drainage water of Quarry 1 after doing effluent from Quarry 2 after ETP and water from Tailangi nala are being conspicuously absent and written as (ND).It seems that which matters for the safety of the locals are being avoided/missed but that which cannot be questioned are given in detail ,for example Inlet to ETP is not which comes in contact with people as it is on the way for treatment but Outlet of ETP is that which matters is not given.

**Kamarda Chromite mines**

**Name of the authority:**

- The report on waste water analysis of Kamarda mines on 20/11/07 shows that Cr+6 amount is unchanged even after (ETP) and that too is more than2 times higher than permissible limits.
- At Saruabil before treatment the level of Chromite is 4 times higher than limits and but after treatment it has written as ND .

The same procedure is followed in Tailangi Mines with a post treatment result depicted as ND.

In Kaliapani mines the untreated water contains 11 times higher than permissible limits but post treatment is lamely excused as ND.

And among all these mines areas **TISCO** mines were found to contain 20 times I.e.2.01mg Cr+6 before treatment but again it is not been given in numerical amount after treatment.

**Jindal Mines, Kaliapani**

**Person visited: S.K.Prusty**

The results of scientist of SPCB board in Jindal Mines shows Hexa-valent chromium 12 and 10 times higher than permitted limits in water tested before and after ETP , which is self explanatory about the degree of contamination it makes to the water of Sukinda River.

Value of Cr +6 at the sample that was collected on 26/12/03 and reported on 13/01/04 of Kathpal ,where drainage water of Maheswar pit and jungle pit were tested it has been mentioned as N.D.

Without test for Cr+6 , the mine was allowed to run and even renewal was made on 31/05/05 vide letter no 16740 with consent order no 172/WPC. And then on 22/06/06 P.Routa ,AEE did not feel to test the amount of Cr+6 of FACOR Kathapal Chromite Mines but on 17/03/07 vide letter no SPCB/BBSR-IND-1-203 , consent for mining was granted up to 31/3/2011.

**Chingudipal Chromite Mines (IMFA)**

- Sample tested on 26/12/03 showed that inlet to ETP and outlet of it were carrying 3 times higher hexa valent chromium
- It indirectly says that the ETP was not functioning and so both values were same
- But within 8 months of time period all the values came down drastically within the range ( is available in the report published on 28/8/06), and within 5 months of this report it was given consent to operate till 31/3/05.vide letter no 2362/460.
- But a sample collected on 07/02/05 when tested was found with 3 times and 2 times higher than permissible limits in the water going to and coming out of ETP respectively and finally on 24/06/05, a letter of refusal of Consent to operate was issued.
- *within a very short span of time one more test was conducted by Sri S.K.prusty A.E.S and the report no WW-16/08/05 dtd 3/9/05, where it was shown that inlet to ETP was 0.852mg/l (more than 8 times higher) where as the sampling of outlet of ETP was not done(ND).*

- *The consent letter bearing no 1 –IND-1-CON-2362/4354 dtd 4/3/06 was published, which was "In Suppression of Board's letter no-18897 dtd 24/06/05 and was allowed to operate* ***from date31/3/06 but the renewal period is not found***.
- After giving the permission for mining one more time test of that water was done where Cr+6 was found 0.72mg/l in the inlet to ETP(which is 7 times higher than permissible limits), but outlet is again mentioned as ND.

**Saruabil mines**

- The inlet and outlet both contains more Cr+6 than it is permitted i.e. at .22 mg/l and .119mg/l respectively.
- One more test on 07/02/05 found that Inlet to ETP was containing 0.41mg/l of Cr+6, where as the content of outlet of ETP was never made .

**Misrilal Mines PVT Ltd**

Sample collected on 28/8/04 shows cr VI content 0.132mg/l in the inlet & the content of chromium in ETP out let is not tested. But it has been allowed to operate.

**M/S ISPAT KALIAPANI CHROMITE MINES**

The report shows that RSPM content at Mines office "which comes under industrial area" is found at 154.3ug/m3 but no stricture was issued for such violation by the pollution control Board.

**OMC South Kaliapani Mines**

- In the report on 9/9/04 it was mentioned vide letter no WW-08/08/04 that drain bypassing ETP contains 0.333mg/l Cr+6 (3 times higher than it is permitted)in to the nala.
- On 31/03/05 a letter vide letter no 10924 SPCB/BBSR-1-IND(CON)-253(A) stated that the mine was given consent to work till 31/3/05 ( i.e. the same day when the time period expires)
- The application for the same was made on 28/3/04. Then why it took so much of time for issuing the permission ????????

And a sample of the same mines which was received on 07/02/05 and reported on 11/02/05 that inlet to ETP contains 0.807 mg /l Cr+6 ,the amount of cr+6 coming out of ETP was not mentioned.

Here one simple question remained unanswered and that is when the sample before treatment contains so high hexavalent chromium then is it not a need to find out and report the value beyond the treatment plant.

- Sample collected on 26th Aug,05 and report published on 3rd Sept,05 shows that ETP outlet of quarry D and F contains .102 and .105 mg/l Cr+6 , which is higher than permissible limits and a refusal notice was served.

- But again on 2/6/06 one more sample was collected and report was published on 22/06/06, where it was shown that the amount of hexavalent chromium from quarry D has reduced more than tenfold and was found at 0.09.

- Even if we look in to the history of permission obtained by the above chromite mines then one can see that in Dec'03, a report that was published on 13/1/04 where Cr+6 was found to be 1.252 ( More than 12times higher than permitted level) in the inlet to the ETP ,then it is expected that the outlet should have been tested but it was not, Why one need to know.

**Sukinda Chromite Mines, TISCO**

Report –WW-04/02/05,Dtd-11/02/05

Under the heading of Cr+6 done in Colorimetric method , it can be seen by anyone that the results that are written all in multiple fold , but cannot be questioned as it is leading to ETP, but that what comes out of the ETP are written as ND. Is it not necessary to test the outlet when Inlet is carrying so much of Hexavalent chromium.

Even treated mine drainage near Kalarangi Chowk is showing 16times higher than permissible and drainage to TISCO colony is around 4 times higher , which is saying all about the ETP and its treatment qualities and most importantly the risk that people around these mines are living with.

Again on 3/9/05 report, kalarahangi chowk is 6 times higher and Bhimtanagar Culvert is shown as 5 times higher. With all these results, then it was allowed to mine till 31/3/06, so what was the law that was followed need to be known.

On 02/06/06 a report of the air pollution in the area, it was shown that the level of SPM was 128ug/m3, but if it is flowing permissible environmental parameters, then places coming under sensitive areas should have the SPM level within 100ug/m3, but here it is much higher but no action was taken or even a notice in this regard was not served to the company.

But afterwards in next test report on 22/06/06 it was shown as ND all the way and by the by a consent letter was given to operate till 31/03/2011. Then where does this high SPM result went is a million dollar answer yet to be known.

**Sukinda Chromite Mines(TATA Steel Ltd), Ostopal, Kaliapani**

Report no WW/L/03/07-25 dtd 19/03/07 shows that second ETP outlet discharge to Damsala River was 0.1697(which is higher than permitted limits) and water of old quarry pit no 9 was at a level of 1.9685mg/l, which is about 20 times higher was found out.

Even in case of Air monitoring result published on 19/02/08, it was shown that the level of SPM recorded on the roof top of the COB plant canteen was found to be as high as 686.3ug/m3, which is beyond every limits and also the case of RPM which should be within 150ug/m3 was found at 227ug/m3 and what course of action was taken in these regards need to be known.

**Kamarda Chromite Mines**

Report no WW-07-05-03 dtd 26/06/03 reported that the inlet and outlet of and from ETP was carrying 0.206 and 0.186 mg/l Cr+6 respectively and both of them are above permitted limits. What action is being moved is not mentioned anywhere.