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Research Paper

An Assessment of Human Health Risk By Using Bp Risc Software

Engineering

KEYWORDS : Carcinogenic, HumanHealth,Anemia,Inhalation,RiskSoftware

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ABSTRACT

Human health risk assessment was performed to estimate the potential human health risk associated with different pollutants. The chemical of potential concern for quantitative risk assessment were selected in accordance with USEPA risk assessment guidelines. Potentially 10 km radius exposed populations were considered for the study. This HHRA considered potential future exposures for adult and child consumers [Adult and Child Residents] via ingestion, inhalation and dermal contact with different pollutants. Non- carcinogenic and carcinogenic health effects were evaluated in this HHRA. For non-carcinogenic effects, hazard quotients [HQs] were calculated by comparing the estimated average daily intakes of pollutant. For carcinogenic effects, incremental cancer risks were calculated by combining the estimated lifetime average daily intakes of different pollutants. If the Hazard Quotient is calculated to be less than 1, then no adverse health effects as per USEPA Guideline are expected as a result of exposure. If the Hazard Quotient is greater than 1, then adverse health effects are possible. The environmental and epidemiological studies conducted at Jhanor lead to the conclusion that the low levels of risk due to pollutant exposures within the area, resulting from the power plant operation and have not caused any adverse effects on human health. The health related problems found during the study like General health related complains, under nutrition, over nutrition, Anemia and Refractive error were appeared to be due to life style related factors and not due to above mentioned pollutants in emission.

Introduction

Health risk assessment is a scientific tool designed to help answer these questions. Risk assessments can also guide regulators in abating environmental hazards. Members of the public who learn the basics of risk assessment can improve their understanding of both real and perceived environmental hazards, and they can work more effectively with decision makers on solutions to environmental problems. In the broadest sense, etiologic agents include not only chemicals or biological agents, but also any factor (e.g., age, sex, nutritional status, stress) that may modify the frequency or distribution of adverse health effects (also more commonly referred to as diseases) in a human community. Although the term is now often used to represent a quantitative assessment process. In recent years, the public has become increasingly aware of the presence of harmful chemicals in our environment. Many people express concerns about pesticides and other foreign substances in food, contaminants in drinking water, and toxic pollutants in the air. Others believe these concerns are exaggerated or unwarranted. How can we determine which of these potential hazards really deserve attention? How do we, as a society, decide where to focus our efforts and resources to control these hazards? When we hear about toxic threats that affect us personally, such as the discovery of industrial waste buried in our neighborhood or near our children's school, how concerned should we be? Chemicals can be either beneficial or harmful, depending on a number of factors, such as the amounts to which we are exposed. Low levels of some substances may be necessary for good health, but higher levels may be harmful. Health risk assessments are used to determine if a particular chemical poses a significant risk to human health and, if so, under what circumstances. Could exposure to specific chemical cause significant health problems? How much of the chemical would someone have to be exposed to before it would be dangerous? How serious could the health risks be? What activities might put people at increased risk? If it were possible to prevent all human exposure to all hazardous chemicals, there would be no need for risk assessment. However, the total removal of harmful pollutants from the environment is often infeasible or impossible, and many naturally occurring substances also pose health risks. Risk assessment helps regulators identify serious health hazards and determine realistic goals for reducing exposure to toxics so that there is no significant health threat to the public. Estimating the hazards posed by toxic chemicals in the environment involves the compilation and evaluation of complex sets of data. These studies include toxicology (the study of the toxic effects of chemicals) and epidemiology (the study of disease or illness in populations). (*www.epa.gov/risk_assessment/health-risk.htm*)

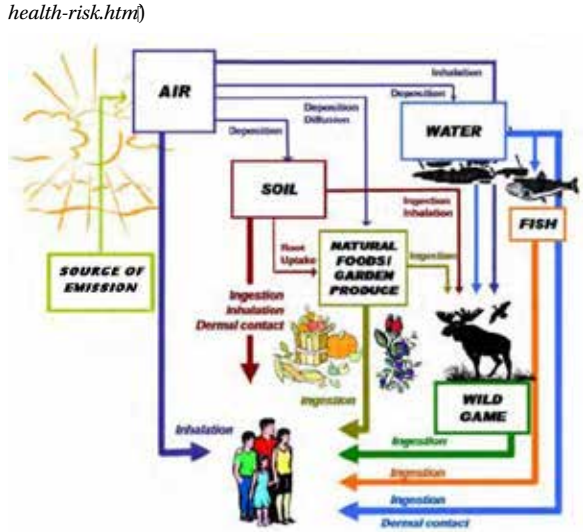

Fig 1: Conceptual Site Model (www.nphp.gov.au/enhealth)

For the health risk assessment chemical exposures and health problems in a community may conduct an epidemiologic study. These studies typically include a survey of health problems in a community and a comparison of health problems in that community with those in other cities, communities, or the population as a whole. Health risk assessment estimates how current or future chemical exposures could affect a broad population.

Although they are both important, health risk assessments and epidemiologic studies have different objectives. Most epidemiologic studies evaluate whether past chemical exposures may be responsible for documented health problems in a specific group of people. In contrast, health risk assessments are used to estimate whether current or future chemical exposures will pose health risks to a broad population, such as a city or a commu-

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nity. Scientific methods used in health risk assessment cannot be used to link individual illnesses to past chemical exposures, nor can health risk assessments and epidemiologic studies prove that a specific toxic substance caused an individual's illness

1.2 OBJECTIVE OF HUMAN HEALTH RISK ASSESSMENT

To estimate hazard index and carcinogenic risk for air, water and soil and hence concluding existence of the adverse impact on human health of surrounding population and ecosystem

1.3 PURPOSE AND SCOPE

The purpose of this report is to characterize the nature and magnitude of risks due to any industry pose to humans who may be exposed in the vicinity of the site.

This risk assessment focuses on current employees and residents surrounding the industry.

The environmental medium of chief concern is contaminated residential area ground water as well as ambient air that may become contaminates

METHODOLOGY & MONITORING RESULTS

2.1 SITE AND SURROUNDING

Plant Location:

The plant, NTPC jhanor Gas Power Plant is located on geographical co-ordinates N21o 49' 25.46" E73o 06' 52.29". Near bank of river Narmada, It is located in rural area, away from influence of other industries. JGGPP is village, which is in Bharuch taluka of Bharuch District of |Gujarat state in India.ntpc is 19.4 Km from main town of Bharuch. The surrounding villages include Kesrol, Kukarwada, Kurala, Luwara, Tarsali, Shahpura, Samlodh, Dabhali, and Angareshwar. Nearby towns include Jhagadia (10.7Km), Bharuch (19.4Km), Ankleshwar (27.2Km) and Valia (28.4Km)

Fig 2: Google location of site point

Environmental survey location:

Table 1.1: Survey Location

Sr.no	Name of location	Distance from NTPC stack in kms	Direction from stack
1	Shahpura	4.39	N-W
2	Nikora	5.76	S-E
3	Jhagadia	4.00	S-E
4	Bharthana	2.63	S-E
5	Jhanor	1.65	N-E
6	Tarsali	4.18	N-E
7	Samlodh	2.10	N-W

2.2 METHODOLOGY ADOPTED FOR ENVIRONMENTAL STUDY:

- Selection of contaminated site done based on the following information:
- Historical data review of past and present contaminated sites
- Identification of potential contamination types
- Site condition
- Preliminary assessment of site contamination
- Site history is fundamental to the preliminary assessment
- Type, extent and level of contamination
- Contaminant dispersal in air, groundwater.
- Potential effects of contaminants on public health, the environment and building structure
- Review and assess all relevant information about the site, including information obtained during a site inspection.

2.3 Ground water Samples:

After purging, evacuation of a minimum of one volume of water in the well casing, and preferably three to five volumes, is recommended for a representative sample. Retrieve the sampler and transfer the sample into suitable labeled sample containers with the help of filter if it is required. The use of plastics, such as PVC or polyethylene, should be avoided when analyzing for organics only.

2.4 Ambient air monitoring

The Standard Operating procedures (SOP) guidelines developed by CPCB for sampling and analysis of ambient air adopted during the monitoring programmed. As the quality of data is of critical importance, regular calibration, servicing and repair of the field device is must. Guidelines issued by CPCB for Calibration and Evaluation of" Ambient Air Quality Monitoring Stations in India" followed.

The eight hourly samples of ambient air quality at ten different locations in and around the plant, within a radius of 10 kms (24 hourly bases) as arrived using Calibrated Hi-Volume samplers. Further, the speciation of NOx carried out.

For ambient air sampling, it is necessary to collect information on qualitative and quantitative data on the local sources of air pollution, topography, population distribution, land use pattern, climatology etc. For example, an area map to locate pollution sources and monitoring locations, sources of pollution situated at far distances, etc. and other relevant data that describe the behavior of atmosphere for a specific pollutant to be sampled may also be require. Ambient air sampling done based on:

- Selection of sampling procedures including procedures of analysis of samples
- Sampling locations
- Period of sampling, frequency of sampling and duration
- Auxiliary measurements (including meteorological parameters)
- Processing of data

2.5 Stack monitoring

(1) One representative Stack Monitoring shall be carried in all the stack of all the Units. The Stack Monitoring shall also involve the Flue Gas temperature and Flue Gas flow rate. Monitoring Methodology shall be followed as per CPCB approved guidelines.

(2) Stack Monitoring of all the required parameters to be carried out which may include SPM, SOX, NOX, & CO2. Further, the speciation of NOx (pollutant of concern) in the ambient air will be carried out.

(3) Mathematical Modeling of Air Quality within a radius of 10 kms in and around the jhanor gas based Power plant for identi-

fication of most affected ten locations and source wise contribution at each of the location to be carried out. This will be carried out using internationally approved model like Industrial Source Complex model or its equivalent using Hourly input of Emissions and Meteorological data. Job involves collection/compilation of the on-site Meteorological data suitable for Air Quality modeling.

Table 2: ANALYSIS PARAMETERS FOR WATER AND AIR MEDIA

SR.NO	WATER PARAMETERS	AIR PARAMETERS
1	PH	PM_{10}
2	TURBIDITY	$PM_{2.5}$
3	TOTAL HARDNESS	SULPHURDIOXIDE
4	CHLORIDES	NITROGENOXIDE
5	SULPHATES	OZONE
6	NITRATES	
7	PHOSPHOROUS	
8	IRON	

RESULTS DISCUSSION.

Human health risk assessment was performed to estimate the potential human health risk associated with different pollutants. The chemical of potential concern for quantitative risk assessment were selected in accordance with USEPA risk assessment guidelines.

Potentially 10 km radius exposed populations were considered for the study. This HHRA considered potential future exposures for adult and child consumers [Adult and Child Residents] via ingestion, inhalation and dermal contact with different pollutants.

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If the Hazard Quotient is calculated to be less than 1, then no adverse health effects as per USEPA Guideline are expected as a result of exposure. If the Hazard Quotient is greater than 1, then adverse health effects are possible.

Environmental studies – which analyze and measure the environmental concentrations of contaminants attributable to the power plant, and compares them with national and international standards, to assess potential risks Results of carcinogenic and non-carcinogenic risk are as under.

Air -The evaluation to Cancer risk revealed that the total cancer risk arising for child resident –upper Percentile was 2.0E -06 and that for adult resident – upper percentile it was found out to be 8.3E -07.

The evaluation to Non-cancer risk revealed that the total risk arising was 1.9E -01 for child resident – upper Percentile and that for adult resident – upper percentile it was found out to be 2.0 E -01.

Water: There is no any adverse effect of water on surrounding population and environment .they are within standard limit.

conclusions

The environmental studies are conducted at NTPC Jhanor lead to the conclusion that the low levels of risk due to pollutant exposures within the area, resulting from the power plant operation and have not caused any adverse effects on human health.

The health risk to various exposure groups [via children and adults] for air came out to be < 1 [Hazard Quotient] for the parameters studied and hence as per USEPA guideline no adverse health effects are expected as a result of exposure due to the operations of NTPC Jhanor activity

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