Chrome dyes are widely used in carpet industries. Waste from the carpet industry rank among the most polluting of all the industrial wastes due to presence of large amount of Cr in it, along with other heavy metals. An unsystematic growth of carpet industry is bound to discharge enormous quantity of Cr rich solid and liquid wastes and contaminate different environmental segments such as hydrosphere, lithosphere and biosphere. In other words it can be said that there is every possible chance of accumulation of Cr in soil, aquatic environment, plants, animals and products of plants and animal origin. Because Cr containing water, foods and other substances may create health hazard to consumer class, therefore, a thorough investigation in this regard should be very useful. As no authentic informations are available regarding pollution of water, milk and associated environmental segments in carpet industrial belt of Eastern Uttar Pradesh, therefore, present research work entitled "Pollution of Water and Milk With Reference to Cr in Carpet Industrial Belt of Eastern Uttar Pradesh" was carried out with following objectives:

1. To determine the status of Cr in water and milk samples of the area under study.

2. To assess the impact of water, soils and grasses, polluted by carpet industrial effluents on Cr content of milk.
Keeping above objectives in mind, a number of research investigations were conducted to fulfill the aims of the proposed research. Samples of water and other aquatic sediments, sewage and industrial effluents, soils, forage crops, grasses and weeds, milk and milk products as well as goats, blood, liver, and kidneys were collected and analyzed at different time intervals. Some of the important findings have been summarized herewith.

Sewage and industrial effluents were found to contain large amounts of Cr and other associated heavy metals. Significant positive correlations were found to exist between Cr and electrical conductivity (EC) of sewage and industrial effluents. Cr content was found to be beyond permissible limits in these effluents, as per standards of WHO (1971) and ICMR (1987). It was also observed that polluted untreated sewage industrial effluents are regularly discharged in water bodies and agricultural lands of the area. Variable amounts of Cr and other associated metals were also observed at sewage outfalls.

Large and variable amounts of Cr were also found in different water samples procured from pollution-prone carpet industrial areas. pH and EC of water samples was also high. Highest Cr concentration was recorded in pond water where eutrophication and stagnancy had taken place. Presence of variable quantities of Cr in water samples of handpumps, dugwells
and tubewells is an indication that Cr had reached the underground through downward and lateral movement. Favourable leaching conditions prevailing in carpet industrial belt had made Cr compounds mobile to such an extent that its concentration in different water resources elevated significantly. So far as quality of water for drinking and irrigation purposes is concerned, these are unfit because Cr content in these waters is beyond permissible limits. Identical to water, accumulation of Cr also occurred in aquatic sediments and aquatic weeds specially water-hyacinth.

Close relationship existing between Cr content of water, aquatic sediment and water-hyacinth is an indication that Cr has become part and parcel of aquatic environment.

Water bodies adjacent to carpet industries contained higher amount of Cr than those away from carpet industries.

Hourly, monthly and seasonal variations were noted in the Cr content of different water resources of the area under study. It was highest in May (summer season) and lowest in August (rainy season).

Soils under the influence of the carpet industrial wastes have accumulated large amount of Cr and associated metals than those soils which were beyond the reach of the industrial effluents. Surface soils have accumulated higher amount of Cr
Than lower horizons. Lesser amount of Cr in deeper horizons is
due to restricted mobility of the metal from upper to lower soil
layers. Clay minerals, fulvic acid and biological residues
possibly have restricted the mobility of Cr in lower horizons.
Negative correlation was observed between pH and Cr, So, pH had
adverse effect on Cr availability.

Four different extractants were used for Cr extraction
in soils. 4 M HNO₃ was found to be more effective extraxtant than
1N NH₄OA, DTPA and 0.1 N HCl.

Organic carbon and clay were found to be important soil
components in influencing the Cr content of polluted soils as
evident from significant positive correlations existing between
these parameters.

Variations were also observed in Cr and associated
metals content of vegetation of polluted as well as non polluted
area. The content of these metals in vegetation of polluted area
was about three times more than vegetation of non polluted area.

In case of forage crops, mustard (a crucifer)
accumulated highest amount of Cr and oats (plant of gramineae
family) the lowest.

So, far as weeds are concerned, maximum accumulation was
observed in water-hyacinth (Eichhornia crassipes). In grasses,
euphorbia hirta accumulated highest Cr content. Identical trend
was observed in vegetation of non polluted area. The order of metal accumulation in forage crops was mustard > berseem > bajra > maize > jwar > oats. The accumulation pattern in grasses and weeds was as Eichhornia crassipes > Euphorbia hirta > Chenopodium album > Cyperus rotundus > Dolichos lablab > Phaseolus calcaratus > Stylosanthes gracilis > Mililotus indica > Cynodon dactylon > Dichanthium annulatum.

Metal content of plants was found to be closely associated to the metal content of soil, water and aquatic sediment. Highly positive correlation was observed between the Cr content of soils and plants.

It was observed that interaction was not found only between water, soils, plants etc, but products of animal and plant origin were also found to be influenced by different polluted environmental segments in the polluted area.

Accordingly milk samples procurred from pollution prone area contained large amount of Cr. Milk samples of indigenous breeds of cows contained higher Cr content than improved breeds, Buffaloes milk also have accumulated large amount of Cr. It was also found that market milk contain more amount of Cr than milk samples taken from stall fed animals. Buffaloes exposed to polluted aquatic environment were found to contain comparatively large amount of Cr. The content of milk Cr was found to be highly
correlated with Cr content of water-hyacinth as well as other aquatic environmental segments. Similar to aquatic environment monthly and seasonal variation was observed in Cr content of milk. Highest Cr content was found in May (summer season) and lowest in September (rainy season).

Significant positive correlation was observed between Cr content of milk and Cr content in segments of aquatic environment. Nitrate content of adulterated milk was also positively correlated with milk Cr.

It was found that about 82.24 per cent of total Cr was present in colloidal form. Milk Cr was positively correlated with milk protein.

Comparative study of Cr extraction by trichloro acetic acid (TCA), dry ashing and wet digestion methods was carried out. Although lower readings were obtained by TCA method but due to its simplicity and less time consumption, this method may be preferred for rapid testing of milk Cr.

Bioaccumulation of Cr was observed in goat blood, liver and kidney. It was found that goats have accumulated large amount of Cr in their blood, liver and kidney and Cr content of milk, blood, kidney and liver increased with increase in age of the animals.

Status of Cr and other associated metals in a number of
indigenous milk products namely khoa, burfi, malai, rabadi, lal peda & safed peda were also determined. It was found that identical to milk and local environmental segments, milk products contained large amounts of Cr and other heavy metals.

On the basis of these findings, it is clear that there is close association between Cr content of aquatic environment, soils, vegetation, blood and body tissues, milk and milk products. So, the findings of this research specially accumulation of Cr in water → soils → animal feeds → animals and their products and their possible effect on the health of consumers forewarn the possibility of low chromium can move from water, soil etc through food chain to human biosphere and ultimately affecting human beings by the process of biomagnification. Therefore, there is great need of awareness among farmers not to allow wastes generated from carpet industries through their fields. Irrigation by eutrophic water resources must be restricted.

Milk vendors should be penalised, if they use to adulterate milk by poor quality water rich in nitrate and heavy metals. Consumers must be aware of the fact that edible substances from carpet industrial area may be highly polluted by Cr. To keep the carpet industrial effluents under permissible limits strict implementation of Pollution Control Acts is necessary.