IMPACTS OF COAL MINING IN BALOCHISTAN

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Abstract

The average emission and prevalence of methane **CH4**, carbon monoxide **CO**, and oxygen **O2** measured as **11.8m3/ton, 36ppm and 14%** respectively which exceeds the permissible limits of **1-10m3/ton, 30ppm and 18 %**(Standardized by National institute of occupational safety and health **NIOSH U.S.A)** and are the source of high death ratio. The higher concentration of coal dust **(carbon and quartz contents of Coal dust)** have been measured as **4-5mg/m3 and 0.35mg/m3** against the threshold limits **(Recommended by NIOSH)** of **2mg/m3 and 0.05-0.1 mg/m3 for 8hours daily and 40hours/week.** The high concentration of coal dust in coal mine areas of Baluchistan is not only the source of health problems like **routine headache, irritation in throat ,nose, and eyes, drowsiness, shortness of breath, nausea, pneumoconiosis, tuberculosis, chronic obstructive bronchitis, heart problems, respiratory irritation, asthmatic and even lung impairment and lung cancer problem,** but is causing severe damage to the Environment**.,** The coal water and slurry being the residual of coal mining are disposed off in an unconfined area which becomes the source of soil and water degradation and the contaminated water taken by coal workers has several health impacts **like ulcer, diarrhea, cholera, hepatitis B** and **C** etc on coal workers of Baluchistan.

Keywords: Threshold limit values (TLVS), Carbon capture and sequestration (CCS), , Maximum allowable concentration (MAC), Occupational Exposure Limits (OEL)

Introduction

The environmental standards during coal mining in Baluchistan are neither implemented nor observed rather it would be more appropriate if we say that the mine owners don't know the environment and its standards. This gives rise to uncontrolled and overexposure of gases and other effluents which happen to cause environmental and health degradation, Steyn, J., and J. Edward, 2007 . The coal mine water; the major source of water pollution in the coal mines is the carryover of the suspended solids in the drainage

system of the mine water .In some of the coal mines, acidic water has also been found in the underground aquifers. Ground water supplies are adversely affected by mining activities. These impacts include drainage of usable water from shallow aquifers, lowering of water levels in adjacent areas and changes in flow directions within aquifers. During the coal mining in Baluchistan, the coal waste is normally dumped in open areas on surface thus it drastically alters the landscape and renders the land unfit for other purposes like vegetation or agriculture. The main source of noise pollution due to coal mining are blasting ,drilling and coal handling which has severe impacts on the health of coal workers. The clearing of trees, plants and top soil from mining areas destroys forests and natural wildlife habitat, it also promotes soil erosion; flooding and stirs up dust pollution. Mountain top removal to remove coal is a large scale negative change to the environment. During mining operations, the potent green house gas, **(methane and carbon)** are released into air and resulting in global warming, Eyre, N., and R. Bellingham, 1998.Due to old and obsolete mining techniques in Baluchistan the emission of gases are more pronounced. Similarly the coal dust is responsible for number of diseases and health degradation in Baluchistan Steffen, S., and D. Ragnvaldsson, 2005.

Material and Methods

The prospective study was conducted on Coal mine workers of Baluchistan from May 2008 to April 2009. Two types of data were collected. Primary data was obtained through questionnaire while Secondary data was collected from; Mine& Mineral department of Quetta, Environmental protection Agency Quetta, hospitals and medicals facilities in coal mine field's areas, Insurance companies, Wild life department, Water, Agriculture, Forest and land department. Total three mine fields were selected (Figure-1) depending upon Geographical location, types of mining carried out and type of coal extracted. For the simplicity and to be more specific in results the selected coal mine fields Mach, So-range-Degari, and Chamalong coal fields were further subdivided as M1(Mach),M2(Mach),andM3(Mach) at Mach coal field, SD1(Sorange degari), SD2(Sorange degari) and SD3(Sorange degari) at So-range-Degari and C1, C2 and C3 at Chamalong coal field.

Fig -1 The pictures of location of mines and sub-mines fields Baluchistan

S/NO	Mine Location	Time Weighted HRS	Average Emission of CH4 m3/ton		Concentration of		Method of Measurement
			During Mining	Post Mining	CO PPM/HR	O2 %age	
1.	Mach coal fields M1,M2,M3	8	11.2	5.43	37	13.5	Mine safety Appliances Mining Detector Meotro NICs serial No 045 MEO 6101 Made in UK
2.	Sorange degori coal fields SD1,SD2,SD3	8	8.7	5.46	35	16.2	“
3.	Chamalong coal fields C1, C2, C3	8	12.5	4.5	37	12.4	“

Source Field work

Results and Discussion

The Exposure limits of gases measured in coal mine fields of Baluchistan are given in below Table-1, 2and 3

Table- 1 Emission of methane (CH4), carbon monoxide (CO) at Selected Sites

Table-2 Comparison of rate of emission of methane

Ser/NO	Country	Emission of %age of CH4 in CF/Million ton
1.	China	9.76
2.	U.S.A	9.0
3.	Pakistan (Baluchistan)	10.2

Source EPA (U.S.A) and EPA Quetta

Table-3 Comparison of carbon monoxide poisoning

Ser/NO	Country	Duration	Death due to CO poisoning/ton of coal produced
1.	China	2005-2009	16
2.	U.S.A		12.4
3.	Pakistan,(Baluchistan)		15.1

Source EPA USA and MMD Baluchistan

The Table-1&2 shows that the gas exposure limits are more than the permissible exposure limits specified by health safety agencies NIOSH, OSHA and MSHA. Methane emission from coal mining depends on the mining methods, depth of coal mining, coal quality and entrapped gas content in coal seams, however the rate of emission of methane should range between **(1-10 m3/ton)** during mining and maximum **3.5 m3/ton** in case of post mining, Watson, L.D., and L. Smith, 2004 , but higher limits measured in both cases especially after post mining the average concentration measure as 6.5% which is very high concentration. The higher concentration of methane reacts with air (CH4+2O2= CO2+2HO) and displaces the prevalence of oxygen, Antao, V.C., and E.L. Petsonk. 2005. as it has been highlighted in above table-1, higher the concentration of CH4, lower the percentage of oxygen (Min 18%) and thus it results in suffocation and ultimately sudden death, Walter, R., and R. Amofah, 2001. One of the reason of sudden death due to over emission of CH4 in Balochistan coal workers is the weak cardiac sensitizers in human following inhalation exposures to high concentration (greater than 5%isobutene and greater than 10% for propane)cardiac sensitizers causes the sudden onset of irregular heart beat and sudden death, Megrran, P., and B. Gustavsson, 2001.In some cases due to high concentration and oxygen deprivation damage to some or all organs including the nervous system and the brain has also been observed in Balochistan coal workers. In some cases Occupational or accidental exposure to CO (Table-3) has caused acute decrements in lung function because of high level car boxy hemoglobin**.** During medical examination headaches**,** dizziness, drowsiness, unconsciousness, nausea, vomiting, shortness of breath has been found common in Balochistan coal workers.

Problems of aging and illness due to CO induced neurobehavioral effects have been observed, because, under normal circumstances, the brain can increase blood flow to tissue, oxygen extraction to compensate for the hypoxia caused by exposure to CO, Talli, J.A., and W. Jiang, 2004

Tissues of highly active oxygen metabolism, such as heart, brain, liver, kidney and muscle may be particularly sensitive to CO poisoning, Wei-Long, A.J., and K.L. Lättström, 2003.When car boxy-hemoglobin levels are higher than **50%** convulsion and cardio pulmonary arrest have been observed. Complications have been observed frequently in CO poisoning like immediate, death, myocardial impairment, hypotension, arrhythmias, and pulmonary edema, Gabe, J., A. Wells and P. Lesvitz, 2008.Perhaps the most insidious effect of CO poisoning observed is the delayed development of neuron psychiatric Impairment and the neurobehavioral consequences, Richard, V., and R.B. Rweing, 2005.Impact on the central nervous system, causing hallucination and a heightened emotional state has also been observed. This is very unfortunate that no stake holder is having such awareness. This has given rise to numerous of health problems like, respiratory Problems, Impairment of long tissues, pneumoconiosis, Impact on brain, kidneys and other organs, itching and irritation problems, Tuberculosis, Asthmatic problem are most common due to overexposure of coal dust in Balochistan. The few of the pictures as shown in Figure-1 of the lungs taken during the X-ray at CMH Quetta of coal workers of all three sites clearly Indicates the presence of all symptoms of lung impairment, changing color of lungs from pink to black is the indications of dusty lung(Figure-2). During medical examination the maximum strength of coal workers was diagnosed with T.B.

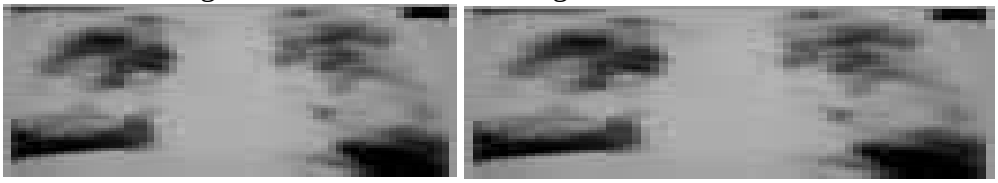


Fig -2 The pictures of damaged lungs of coal workers of so-range Degari taken during medical examination at CMH Quetta

A comparison between the numbers of death due to coal extraction in different coal producing countries has been shown in below tables-4

Table -4 Coal Production in Million tons VS Death

Ser/NO	Country	Year	Million tons of coal produced	Death occurred
1.	Pakistan **(**Baluchistan**)**	2004-2005	1.89	77
		2005-2006	2.02	246
		2006-2007	1.92	180
		2007-2008	2.30	345
		2008-2009	1.98	78
2.	China	2004-2005	60.44	55
		2005-2006	50.27	45
		2006-2007	46.01	42
		2007-2008	41.35	38
3.	India	2004-2005	198.3	180
		2005-2006	80.2	73
		2006-2007	116.9	136
		2007-2008	147	163

Source: -Field Result and ISBN 2005

In Table-4 we find maximum deaths in china because maximum coal is produced in china in the world whose **75-80%** of economy depends on energy produced by coal. Yohi, R.J., and K.K. Wong, 2007. Where as in Balochistan we do not produce compatible coal, but the rise in death as compared to U.S.A and Australia is quite high which is just because of use of obsolete mining equipment (Room and pillar Method) and non-adherence to safety measures. Similarly the emission rates of coal dust (carbon and Quartz) and concentration of suspended and Respirable dust particle measured during the field work are appended below in Table-5, 6&7

Table-5 Summary of field results of Coal dust exposure at selected sites

S/NO	Mine ID	Location of Reading	Average Dust Concentration mg/m3	Threshold Limit Value mg/m3	Difference mg/m3
1.	Mach (Abe-gum) M1,M2,M3	At the face of mine	5.26	2	+3.26
2.	Mach (Abe-gum) M1,M2,M3	At the loading place	4.25	1-2	+2.25
3.	Mach (Abe-gum) M1,M2,M3	At Ventilation / Exhaust	3.47	2	+1.47
4.	Sorange degari SD1,SD2,SD3	At the face of the mine	3.54	2	+1.54

5.	Sorange degori SD1,SD2,SD3	At the loading point	3.05	1-2	+1.05
6.	Sorange degori SD1,SD2,SD3	At Ventilation / Exhaust	2.75	2	+0.75
7.	Chamalong C1,C2,C3	At the face of mine	5.2	2	+2.2
8.	Chamalong C1,C2,C3	At loading place	4.35	1-2	+2.35
9.	Chamalong C1,C2,C3	At Ventilation / Exhaust	4.05	2	+2.05

Source Field Work

Table-6 Summary of the field results of quartz exposure at selected sites

S/NO	**Mine ID**	**Location of Reading**	**Average Dust Concentration** mg/m3	**Threshold Limit Value** mg/m3	**Difference** mg/m3
1.	Mach (Abe-gum) M1,M2,M3	At the face of mine	0.67	0.1	0.57
2.	Mach (Abe-gum) M1,M2,M3	At the loading place	0.55	0.05-0.1	0.45
3.	Mach (Abe-gum) M1,M2,M3	At Ventilation /Exhaust	o.44	0.1	0.34
4.	Sorange degori SD1,SD2,SD3	At the face of the mine	0.45	0.1	0.35
5.	Soange degori SD1,SD2,SD3	At the loading point	0.39	0.05-0.1	0.29
6.	Sorange degori SD1,SD2,SD3	At Ventilation / Exhaust	0.35	0.1	0.25
7.	Chamalong C1,C2,C3	At the face of mine	0.67	0.1	0.57
8	Chamalong C1,C2,C3	At loading point	0.58	0.05-0.1	0.45
9	Chamalong C1,C2,C3	At Ventilation / Exhaust	0.52	0.1	0.42

Source; Field work

Table-7 Concentration of particles in coal dust in time weighted average in Comparison of W.H.O

S/NO	Mine Location	Type of Pollutant	Average Flow Rate	Time Weighted Average	Average Concentrate in Ambient Air	WHO Permissible Limit	Equivalent Used	Measuring Principle	Analytical Method	Equipment Used
1.	Mach coal field	Suspended particulate matter Respirable particulate matter	1/m3/minute 1/m3/minute	24 hours daily 24 hours daily	625 µ g/m3 170 µ g/m3	500 g/m3 µ 24 hour 150 g/m3 µ	High Volume sampler	Aerodynamic sampling followed by gravitational measurement	Gravimetric	Gravimetric G-1023 NF of U.K.
2	So range coal field	SPM RPM	1.1/m3/minute 1/m3/minute	24 hours daily 24 hours daily	610 g/m3 µ µ 185 g/m3	500 µ g/m3 150 µ g/m3	High Volume sampler	Aerodynamic sampling followed by gravitational measurement	Gravimetric	Gravimetric G-1023 NF of U.K.
3.	Chamalong	SPM RPM	1/m3/minute 1/m3/minute	24 hours daily 24 hours daily	630 µ g/m3 155 µ g/m3	500 µ g/m3 150 µ g/m3	High Volume sampler	Aerodynamic sampling followed by gravitational measurement	Gravimetric	Gravimetric G-1023 NF of U.K.

Source: -Field work

Exposure to coal dust; The tabulated values received as a result from analysis in EPA laboratory have exceeded the recommended exposure limits as given by like **NIOSH, OSHA** and **ACGIH**. The most obvious reason of higher concentrations of coal dust in Balochistan coal fields is the lack of monitoring by EPA, and mine and mineral department (MMD), implementation of environmental laws and free hand to mine owners, moreover no precautionary measures are taken by coal workers and mine owners. This give rise to numerous of health problems and environmental degradation. The inhalation of these particles through airways, throat and finally goes into lungs and causes damage like irritation in eyes, throat and nose, Lungs infection and impairment, Shortness of breath, wheezing,

Asthma, Coughing and Chest pain has been reported from coal mine workers of Balochistan etc. The summary of health problems of coal mine workers reported from different hospitals for five years is given below in Table-8

Table -8 Yearly health analyses of coal workers of Balochistan

Ser/NO	**Types of Occupational Illnesses**	**No of patients / year**				
		2005	**2006**	**2007**	**2008**	**2009**
1.	T.B	204	289	319	307	379
2.	Post T.B	348	372	412	407	389
3.	Bronchitis	396	422	453	392	512
4.	Asthmatic problems	423	447	492	398	307
5.	Skin and other infection	729	597	612	707	779
6.	Hypertension	837	714	745	810	823
7.	Lung C.A	149	112	132	79	93
8.	Death in hospital due to injury	119	139	122	98	109

Source; Data collected from different hospital at Quetta

Impacts of coal waste. During coal mining no doubt the coal mine waste water and coal waste **(coal slurry)** come out as the product waste and spread out into unconfined place at Baluchistan coal fields. It contaminates(Degrade) the nearby source of drinking water that water is used by coal mine workers and they are suffering from numerous waterborne diseases, this was investigated by taking the water sample and testing it into laboratory, the results in comparison of WHO prescribed limits have been tabulated in table-9&10

Table-9 Concentrations of suspended solid in coal mine waste of Balochistan

Ser/NO	**Mine Location**	**Type of effluents**	**Measured qty in mg/L except PH**	**WHO standards in mg/L, except/pH**	**Measuring apparatus**
1	Mach coal field	PH	4.9	6.9	PH meter's/no 558272,HM 25r, TKK_TOA Japan
		Turbidity	0.59	0.5	Turbidity meter's/no F412R-05NB Nippon Dashiki Japan
		BOD	220	250	Hatch BOD Track's/no 26197-01/0104103 U.S.A
		COD	370	400	Hatch COD Reactors, s/no 021200010120 p/n45600-02 love land colo U.S.A
		TSS	425	400	Vacuum Pump filter system for TSS
		TDS	3720	3500	Ion sense meter hatch TDS-EC Salinity meter
2.	Sorange coal field	Taste	Objectionable	-	-
		Odor	Objectionable	-	-
		Hardness	515	500	Titration Method, NO 460130
		PH	5.0	6.9	PH meter

Ser/NO	Mine Location	Type of effluents	Measured qty in mg/L except PH	WHO standards in mg/L, except/pH	Measuring apparatus
		Turbidity	0.57	0.5	Turbidity meter
		BOD	215	250	Hatch BOD Track
		COD	350	400	Hatch COD Reactors
		TSS	430	400	Vacuum Pump filter system for TSS
		TDS	3600	3500	Ion sense meter hatch TDS-EC Salinity meter
		Taste	objectionable		
		Odor	“	“	-
		Hardness	530 mg/L	500 mg/L	Titration Method
3.	Chamalong coal field				
		PH	4.9	6.9	PH meter
		Turbidity	0.52	0.5	Turbidity meter
		BOD	225	250	Hatch BOD Track
		COD	360	400	Hatch COD Reactors
		TSS	435	400	Vacuum Pump filter system for TSS
		TDS	3650	3500	Ion sense meter hatch TDS-EC Salinity meter
		Taste	Objectionable		
		Odor	“	“	-
		Hardness	520	500 mg/L	Titration Method

Source- Field work and WHO-2007

Note:-

BOD - Bio-available oxygen demand
COD - Chemical oxygen demand
TSS - Total suspended solid.
TDS - Total dissolved solid.

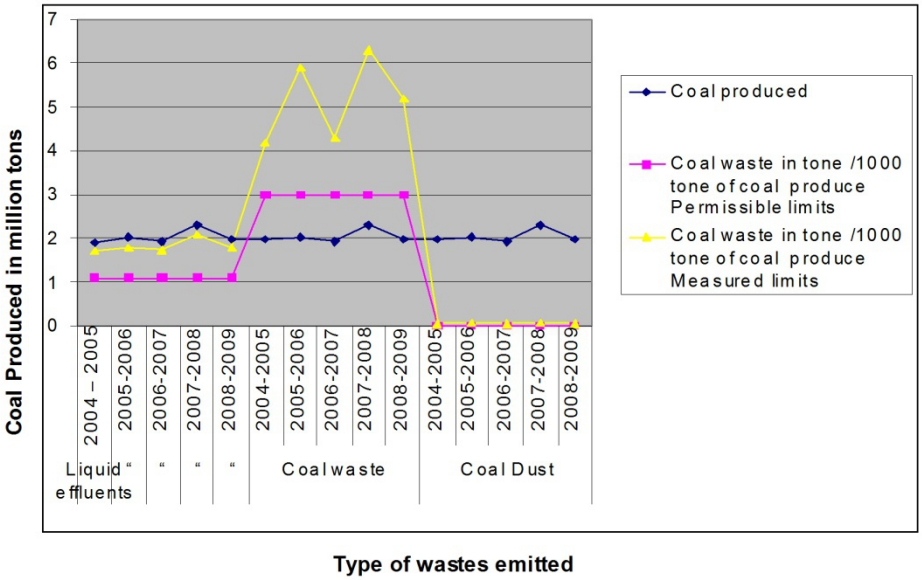
Table -10: Coal waste produced per ton of coal from Balochistan coal fields.

S/NO	Mining technique	Parameter	Year of production	Coal produced in million tons	Coal waste in ton /1000 ton of coal produce	
					Permissible limits	Measured limits
1	Underground	**Liquid effluents**	2004-2005	1.89	1.1	1.7
		"	2005-2006	2.02	1.1	1.8
		"	2006-2007	1.92	1.1	1.74
		"	2007-2008	2.3	1.1	2.09
		"	2008-2009	1.98	1.1	1.8
2.	Underground	**Coal waste**	2004-2005	1.98	3	4.2
			2005-2006	2.02	3	5.9
			2006-2007	1.92	3	4.3
			2007-2008	2.3	3	6.3
			2008-2009	1.98	3	5.2
3.	Underground	**Coal Dust**	2004-2005	1.98	0.01	0.041
			2005-2006	2.02	0.01	0.087
			2006-2007	1.92	0.01	0.043
			2007-2008	2.3	0.01	0.091
			2008-2009	1.98	0.01	0.045

Source; EPA and MMD Quetta

The comparison shows the concentration limits of **TSS and TDS** in Balochistan coal fields are higher than prescribed by W.H.O. The higher concentration of these effluents makes the water heavier and unsuitable until unless it is purified and the lower PH value shows that the water is acidic. The less **BOD** and **COD** demand shows that either the microorganisms are less in numbers or mostly dead due presence of higher concentration of **TDS and TSS**. Moreover the non-availability of facility to purify the water has become one of the reasons of no of health impacts in coal workers of Balochistan. In this way the water at coal mine fields and surrounding becomes unsuitable for drinking purposes. The quantity of coal waste

produced is more than the requisite limits as prescribed by W.H.O which speaks of the substandard mining techniques in Balochistan. This element contributes towards the deterioration of health of coal workers, Environmental degradation (Air, water and soil degradation).and significant impact on the economy of the province. The results so obtained can be represented graphically in comparison with W.H.O (Figure-3)



Noise Impact due to coal mining Noise in coal mining is obvious and is displeasing for coal workers that disrupt the activating and life as well Whispers, B., and J.K. Robinson, 2006.like impaired hearing, damage to hearing system, deafness etc due to produced noise Rathus, A.K., and J.K. Robert, 2006.and obviously noise pollution. Mining operation like drilling, collection, transportation and handling of coal, sizing and segregation units are the major source of noise pollution/degradation in underground coal mining of Baluchistan.

Land/Soil degradation; The coal waste produced is disposed off in an open area in Balochistan. The coal Slurry and other wastes in the shape of liquid or solid are not disposed off at a confined place rather spread out in surrounding areas at far of place and this overburden is dumped on surface, preferably on mined-out or de-coaled area (Figure-4). Therefore this type of mining requires quite large area on surface. In this way coal mining drastically alters the landscape and renders the land unfit for other purposes like vegetation or agriculture Nitish, J.S., and V.P. Yadarshi, 2008. due to removal of top nutrients and thus decreasing the yielding capacity of soil.

Fig-4 Land Degradation Due to coal waste water and acid mine drainage at Balochistan coal field

This aspect of land degradation in underground coal mines is due to subsidence over the underground cavity resulted**.** During coal mining in Balochistan about **20 – 25%** of coal is removed as waste and it is disposed off as the loose dumping as landfill, which causes soil degradation. Tailings produced as slurry are often drained out without proper impoundment into the streams, which use to contaminate the water. The slurry settles there and dries out and makes the soil for no more use.

Many a times**;** large forest areas have been transferred for coal mining purpose. The clearing of trees, plants and topsoil from mining areas have destroyed forests and natural wildlife habitats. It has also promoted soil erosion and flooding and stirred up dust pollution that has lead to respiratory problems in coal workers and even nearby communities. It was revealed through questionnaire and physical inspection also that the area near coal mining was mostly barren or with wild bushes. The cultivation was to be carried out prior the mining operation but since the yield was decreased with passage of time, so the farmers left the area and the wild bushes took the crop place and Made the area barren, in this way a huge cultivatable land was lost due to coal mining. The area could have been saved if monitoring agencies should have implemented the re-vegetation process.

Biodiversity; During the field work It was pointed out by coal workers, coal owners and even the local population that there used to be a variety of wild animal like bear, Jackal, fox, stage and even lion use to be found in the area but illegal hunting, coal mining, man generated activities have decreased the strength of wild animal, moreover the migrating birds which use to come to Balochistan are very rare due to the occupation of the area because of coal mining activities

Impact on Communities; Balochistan is a deserted place, where the cities, towns or villages are quite far apart and scattered. The coal mining activity is carried out normally quite away from living communities, however at scattered places the people are living in near vicinity of mined

area. Moreover the families of coal workers are very close to the mined area, therefore the coal workers and their families are the most victimized due to coal mining. Community is affected due to acid mine drainage AMD and water impurities mostly, soil and air degradation Karl, H.D., and J.H. Edwent, 2006.

Aesthetic effect; although the coal mining is considered a source of revenue for the province but at the same time its unhealthy and unpleasant activity (Figure-5). The poor and unhygienic living conditions of coal workers of Balochistan, unsafe water and food has made the life of coal workers quite miserable and is leaving negative impact on environment.

Fig-5 Unhygienic living conditions of coal workers

More over the storage of spoil and rejects has the potential to cause adverse environmental impacts. The extraction of coal by mining disrupts virtually all aesthetic elements of the landscape, in some cases the new linear patterns appear as material is extracted and waste piles are developed. Different colors and texture are exposed as vegetative cover is removed and overburden dumped to the side, Dust vibrations are created, affecting sight, sound and smell. Some members of local communities may find such impacts disturbing or unpleasant

Negative change to Environment; Mountain top removal to remove coal is a large scale negative change to the environment. Tops are removed from mountains or hills to expose thick coal seams, underneath, the soil and rock removed are deposited in nearby valleys, hollows and depressions, resulting in blocked and sometimes contaminated water ways. The remediation is often delayed for decades; one of the legacies of coal mining is the low coal content waste forming slag heaps. In addition, all forms of mining are likely to generate over as where coal is stacked and where the coal has significant sulfur content, such coal heaps generate highly acidic, metal – laden drainage when exposed to rainfall. These liquors can cause severe environmental damage to receiving water courses

Climate Change; The consequences which are attributed directly and indirectly to human activities, like coal mining activities result in the

alteration in the composition of the atmosphere and the global climate in General, thereby causing climate change Gurdeep, R.B., and S. Smitha, 2009. Over emission of Methane CH4 and carbon monoxide CO both green house gases from the coal fields of Balochistan may not be significant but contributing towards the climate

Conclusion

Though many research are being conducted all over the coal mining countries for the improvement in coal extraction techniques, to overcome the emission rate of methane and carbon and thus to reduce the death and injury rate and environmental degradation. Efforts have also been instituted to overcome and reduce the toxicity of coal effluents on the health of the coal workers, but in Pakistan especially in Balochistan no such measures have been taken by Government and mine owners. On a similar fashion a study was designed to ascertain whether the coal mining in Balochistan is carried out as per the international standard or not. The special emphasis was laid to evaluate the environmental degradation in Balochistan. The analysis of samples in EPA Laboratory and pathological tests results have revealed that due to overexposure of coal dust and over emission of methane, carbon and other coal effluents are not only the source of rise in death toll, have severe health implications and are the contributing factors towards the environmental degradation by contaminating air, water and soil. No doubt the extraction of fossil fuels is the big source of environmental degradation and global warming. Today most burning issue is the climate change issue due to emission of CO2 and CH4 which are the green house gases and their excess emission contributes in rise of temperature and thus changing the climate.

References:

Eyre, N., and R. Bellingham. 1998. Environmental Impacts of Energy. Journal of Environmental Degradation. Vol. 3(11): 14-18.

Gabe, J., A. Wells and P. Lesvitz, 2008. Black Lung, A Disease of Coal Workers. American Journal of Environmental Sciences. Vol. 2(7): 19-41.

Gurdeep, R.B., and S. Smitha. 2009. Coal Mining and Pollution. Indian Journal of Mining. Vol. 5(1): 7-9.

Karl, H.D., and J.H. Edwent. 2006. Respiratory Disease Induced by Coal Mine Dust. Massachusetts Medical Society Journal Vol. 4(6): 17-23.

Megrran, P., and B. Gustavsson. 2001. Health effects associated with the inhalation of Hydrogen Sulfide in Idaho. American journal of occupational safety and health Vol. 6(16): 63-67.

Nitish, J.S., and V.P. Yadarshi. 2008. Impacts of mining industries in Jharkhand. Indian Journal of Occupational Medicines. Vol. 3(31): 36-43.

Rathus, A.K., and J.K. Robert. 2006. Mining and Aids Brief. Journal of Impacts of Mining. Vol. 3(1): 8-10.
Richard, V., and R.B. Rweing. 2005. Mining and prediction of coal worker's pneumoconiosis with bioavailability iron content in the bituminous coal. International Journal of Environmental Health Pakistan. Vol. 9(5): 32-43.
Steffen, S., and D. Ragnvaldsson. 2005. Occupational Asthma. International Weekly Journal of Science. Vol. 2-4(1): 20-29.
Steyn, J., and J. Edward. 2007. Environmental Assessment of Mining Projects. Environment Department World Bank Note Number 22: 36-39.
Talli, J.A., and W. Jiang. 2004. Indigenous Environmental Justice Issues Enter the Global Ring, Australian Journal of Environmental Studies. Vol. 14(1): 14-15.
Walter, R., and R. Amofah. 2001. Real problems of coal mine workers. Indian Journal of Medicine. Vol. 52(7): 32-35.
Watson, L.D., and L. Smith. 2004. The environmental concern. Asian Journal of Medicine. Vol. 2(3): 5-836.
Wei-Long, A.J., and K.L. Lättström. 2003. How mining affects the workers. International Journal of Medicines. Vol. 2(6): 45-48.
Whispers, B., and J.K. Robinson. 2006. How to avoid the hazards of mining. Asian Journal of Mining. Vol. 5(2): 5-7.
Yohi, R.J., and K.K. Wong. 2007. The true cost of coal in India. Indian journal of mining. Vol. 7(10): 61-110.Weeks, J. L. 2003. The fox guarding the chicken coop: monitoring exposure to respirable coal mine dust, 1969-2000. Am. J. Public Health 93 (8):1236-44.
Antao, V.C., and E.L. Petsonk. 2005. Rapidly progressive coal workers' pneumoconiosis in the United States: Geographic clustering and other factors. Occup. Environ. Med. 62(10): 670-74.