

# Initial Environmental Examination

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February 2018

## PAK: Balochistan Water Resources Development Sector Project

Project No. 48098-002

Part 4 of 4

Prepared by Irrigation and Power Department, Government of Balochistan for the Asian Development Bank (ADB).

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## Annexure 11: Karkh River Development Subproject

### Proposed gross irrigation requirements - Karkh River Development Subproject

Conveyance efficiency		82%	Field efficiency			80%	Irrigation efficiency			65%	Command Area 2250 Hectare	
Months	Crops	Cotton	Fodder	Kh. veg	Pulses	Onion	Barley	Wheat	Melon	Orchard	Rabi veg	Total
	%	10	7	15	4	5	2	50	2	14	11	120
	Area in Hectare	225	157	338	90	113	45	1125	45	315	247	2,700
Apr		0	17	28	0	13	4	121	8	15	0	206
May		15	25	53	0	29	8	71	9	23	0	233
Jun		62	33	98	0	28	12	0	9	21	0	264
July		56	35	84	0	18	2	0	8	19	0	221
August		25	37	56	0	0	0	0	7	19	0	144
September		20	33	0	0	0	0	0	0	15	0	68
October		12	19	0	1	0	0	81	0	10	0	123
November		0	11	0	10	0	0	86	0	6	19	131
December		0	3	0	5	0	0	73	0	2	11	95
January		0	3	0	1	0	0	78	0	2	15	98
February		0	3	0	0	0	0	104	4	4	20	134
March		0	7	0	0	6	1	112	6	7	0	137
<b>Maximum Demand (Hectare-Meter)</b>												<b>1,854</b>
<b>Annual Demand (MCM)</b>												<b>18.5</b>
<b>Maximum Demand (Cumec)</b>												<b>1.01</b>

## Agriculture with and without project - Karkh River Development Subproject

																CCA 2,250 Ha	
Crop		Cotton	Maize	Rice	Lady finger	Tomato	Fodder	Guar	Mung	Sorghum	Melon	Spinach	Wheat	Barley	Onion	Cabbage	Total
Without Project	Area (Ha)	113	0	0	158	113	158	68	0	90	0	45	203	785	45	225	2,000
	Cropping intensities (%)	5	0	0	7	5	7	3	0	4	0	2	9	35	2	10	89
	Yield (Kg/Ha)	1,800	1,100	2,650	4,000	14,250	14,820	18,000	600	850	900	13,000	4,500	2,285	1,279	16,500	
	Production (Tons)	203	0	0	630	1,603	2,334	1,215	0	77	0	585	911	1,794	58	3,713	
With Project	Area (Ha)	225	0	0	225	113	158	113	0	90	0	45	315	1,125	45	248	2,700
	Cropping intensities (%)	10	0	0	10	5	7	5	0	4	0	2	14	50	2	11	120
	Yield (Kg/Ha)	3,256	1,250	2,850	6,600	6,160	19,200	16,700	16,060	634	17,050	9,265	11,550	2,750	1,375	16,700	
	Production (Tons)	733	0	0	1,485	693	3,024	1,879	0	57	0	417	3,638	3,094	62	4,133	

**Economic and financial analysis - Karkh River Development Subproject**

Benefits From Farming					
Scenario	Conditions	Area (ha)	Million Rs.		
			GVP	Farm Cost	NVP
Main Crops - Financial Prices	Without Project	2000	202.9	90.7	112.2
	With Project	2700	530.0	242.0	288.0
Main Crops - Economic Prices	Without Project	2000	213.8	94.4	119.4
	With Project	2700	525.0	237.6	287.4
Watershed & Rangeland Farming - Financial Prices	With Project	210	18.7	4.1	14.6
Watershed & Rangeland Farming - Economic Prices	With Project	210	15.5	3.8	11.8
Benefits From Livestock (Rangeland)					
Yearly Net Revenue of Production From Livestock					
Year	Livestock (Cattle, Sheep, Goat and Poultry) in Million Rs.				
	Financial Value of NRP	Economic Value of NRP			
1	1.0	0.9			
2	4.9	4.4			
3	5.9	5.3			
4	7.1	6.4			
5	8.5	7.6			
6	10.2	9.2			
Gender Economic and Financial Activity					
Benefits From Health "With Project"					
(Benefits) In Million Rs.					
Analysis	Financial		Economic		
According to Women Labor Wage Rates	1.6		1.12		
Women Economic Activity in Poultry, Tailoring and Embroidery Sector	0.4		0.34		
Internal Rate of Return (IRR)					
Financial Internal Rate of Return (Base Model) FIRR			17.77%		
Economic Internal Rate of Return (Base Model) EIRR			18.78%		

## Annexure 12: Kharzan Hatachi Infiltration Gallery Subproject

### Proposed gross irrigation requirements - Kharzan Hatachi Infiltration Gallery

Conveyance efficiency		82%	Field efficiency		80%	Irrigation efficiency		65%	Command Area 681 Hectare
Months	Crops	Fodder	Kh. Veg.	Pulses	Rice	Wheat	Melon	Rabi veg.	Total
	%	31	32	19	1	27	6	4	120
	Area in Hectare	210	216	129	7	186	40	29	817
Apr		23	18	0	0	20	7	0	68
May		33	34	0	2	12	8	0	88
Jun		44	63	0	2	0	8	0	117
July		47	54	0	2	0	7	0	109
August		50	36	0	1	0	6	0	93
September		44	0	0	1	0	0	0	44
October		25	0	1	0	13	0	0	40
November		14	0	14	0	14	0	2	45
December		4	0	8	0	12	0	1	25
January		4	0	1	0	13	0	2	19
February		4	0	0	0	17	3	2	27
March		9	0	0	0	19	5	0	32
Annual Demand (Hectare-Meter)									707
Annual Demand (MCM)									7
Annual Demand (Cumec)									0.44

## Agriculture with and without project - Kharzan Hatachi Infiltration Gallery Subproject

													CCA: 681 ha	
Crop		Cotton	Rice	Lady finger	Spinach	Tomatoes	Fodders	Mung	Sorghum	Melons	Wheat	Onions	Cabbage	Total
Without Project	Area (ha)	0	5	40	0	112	45	90	102	28	130	0	20	572
	Cropping intensities (%)	0	1	6	0	16	7	13	15	4	19	0	3	84
	Yield (Kg/Ha)	0	1482	3000	0	4809	15993	456	500	12000	2284	0	14550	
	Production (Tons)	0	7.41	120.00	0	538.61	719.69	41.04	51.00	336.00	296.92	0	291.00	
With Project	Area (Ha)	68	0	68	34	68	0	68	136	34	238	68	34	817
	Cropping intensities (%)	10	0	10	5	10	0	10	20	5	35	10	5	120
	Yield (Kg/ha)	1,250	0	3,300	14,500	5,290	0	502	831	13,200	2,512	16,907	16,005	
	Production (Tons)	85.13	0	224.73	493.73	360.24	0	34.16	113.18	449.46	598.83	1151.37	544.97	

**Economic and financial analysis - Kharzan Hatachi Infiltration Gallery Subproject**

Benefits From Farming					
Scenario	Conditions	Area (ha)	Million Rs.		
			GVP	Farm Cost	NVP
Main Crops - Financial Prices	Without Project	575	65.4	32.0	33.4
	With Project	817	236.4	83.3	153.1
Main Crops - Economic Prices	Without Project	575	67.4	32.9	34.5
	With Project	817	227.3	75.2	152.1
Khushkaba Farming - Financial Prices	With Project	378	106.2	7.9	98.2
Khushkaba Farming - Economic Prices	With Project	378	81.8	8.9	72.9
Benefits From Livestock (Rangeland)					
Yearly Net Revenue of Production From Livestock					
Year	Livestock (Cattle, Sheep, Goat and Poultry) in Million Rs.				
	Financial Value of NRP	Economic Value of NRP			
1	1.0	0.9			
2	4.9	4.4			
3	5.9	5.3			
4	7.1	6.4			
5	8.5	7.6			
6	10.2	9.2			
Gender Economic and Financial Activity					
Benefits From Health "With Project"					
(Benefits) In Million Rs.					
Analysis	Financial		Economic		
According to Women Labor Wage Rates	1.6		1.12		
Women Economic Activity in Poultry, Tailoring and Embroidery Sector	0.4		0.34		
Internal Rate of Return (IRR)					
Financial Internal Rate of Return (Base Model) FIRR			15.98%		
Economic Internal Rate of Return (Base Model) EIRR			17.56%		

### Annexure 13: List of the Villages where Public Consultation was held

Location	Participants
Khuzdar, Guest House	Mr. Salim
Karakh(meeting with land lord/ Stake Holders)	Mr. Rafiq Jamot (Sinjori/Acharwand) Mr. Ghous Baksh(Khadri) Mr. Arif(Khadri) Mr. Kamran(Khadri) Mr. Saeed Ahmed(Lakhorro) Mr. Abdul Ghaffar(Chutta)
Hatachi /Kazran (meeting with land lord/ Stake Holders)	Mir. Mohammad Alam Sardar Jalal Khan Ghulam Sarwar Mir.Mohammad Azeem Allah Bakash Mohammad Aslam Abdul Ghafar Faiz Mohammad Mohammad Ashraf
Khuzdar	Mr. Iqbal, Forest Dept
Quetta	Mr. Nassebullah, IUCN



## Annexure 14: Photographs of Consultations



Hatachi /Kazran (meeting with Stakeholders)



Meeting with Mir of Kazran and stakeholders of Hatachi / Kazran



Stakeholder consultation with agriculturists of Chutta, Acherwant at Wandhri



Stakeholder consultation with agriculturists of Chutta, Acherwant at Wandhri





Stakeholder consultation with agriculturists of Khadri at Wandhri



Meeting with Sub-Engineer, Irrigation and Power Department at Khuzdar



Meeting with agriculturist at Chutta weir



Sampling during field visit at Khadri

## Annexure 15: Emergency Response Plan for Damage of Infiltration Gallery

Infiltration Gallery is susceptible to damage from natural disasters such as flooding, earthquakes, landslide etc. In the event of a major disaster, the following is expected:

- There is not enough source water available to meet demand,
- There is a problem with the intake, or infiltration gallery, that does not allow enough water to be drawn

A natural disaster creating the situation when water from the source cannot be drawn, preventative measures are prescribed as follows:

- Regular inspection of intake for damage or clogging
- Regular inspection of intake failure

Causes	Preventive measures
<b>Event: CANAL BREACHING</b>	
Canal breaching	<ul style="list-style-type: none"> <li>• Closing of gaps in flood walls by sand bags or other available methods;</li> <li>• Protection of river banks by sand bags, stone, or other available methods;</li> <li>• Counteracting piping which is the main cause of collapse of embankment and dykes etc.;</li> <li>• Protection of bridge piers, weirs, barrages and dams against erosion by rockfill, sand bags and other available methods;</li> <li>• Construction of temporary non-structural protection measures to prevent the propagation of flood on non-protected land;</li> <li>• Cutting of embankment, dykes etc. in order to allow flooding of less important areas, and thus to save other more important areas;</li> <li>• Removing obstacles from active or potential flood ways, relief and flood bypass channels; and</li> <li>• Protection of structures exposed to strong wind wash action.</li> </ul>
<b>Event: NOT ENOUGH SOURCE WATER AVAILABLE</b>	
Drought.	<ul style="list-style-type: none"> <li>• Start water conservation measures as soon as water shortage becomes likely.</li> <li>• Plan the development and use of the water source,</li> </ul>
<b>Event: POOR RAW WATER QUALITY DURING HEAVY RAINS</b>	
Heavy rain leading to high levels of turbidity	<ul style="list-style-type: none"> <li>• Stabilise raw water quality (using, eg, infiltration gallery or raw water reservoir) to avoid periods of very poor quality.</li> <li>• Inspect catchment for signs of erosion and slips that will potentially be ongoing problems.</li> </ul>



Causes	Preventive measures
<b>Event: CONTAMINATION OF THE RIVER OR STREAM</b>	
Contamination sources present in the catchment.	<ul style="list-style-type: none"> <li>Identify potential sources of contamination</li> <li>Ensure that changes in land use (including urban developments) and the potential for contamination they create, are well monitored after commissioning of the source.</li> <li>Restrict activities in the catchment that may contaminate the water.</li> <li>Gather information about the hydrology of the catchment before undertaking development.</li> </ul>
<b>Event: WATER QUALITY NOT IMPROVED BY INFILTRATION GALLERY</b>	
Sediment load in raw water too high.	<ul style="list-style-type: none"> <li>Establish levels of raw water quality that the gallery cannot handle, and turn the gallery pumps off when these are exceeded.</li> </ul>
Poor infiltration gallery design.	<ul style="list-style-type: none"> <li>Take account of the range of possible raw water qualities when designing the gallery.</li> </ul>
<b>Event: INFILTRATION GALLERY PRODUCES LESS WATER THAN IT WAS DESIGNED FOR</b>	
Clogged gravel packs in the infiltration gallery.	<ul style="list-style-type: none"> <li>Turn off the gallery under extreme conditions to minimise drawing sediment deep into the gravel packs.</li> <li>Regular programme to scarify gravel pack with tractor mounted unit. (NB: If gallery is in the stream bed a resource consent will be required.)</li> <li>Regular programme of cleaning gravel packs using compressed air lances.</li> </ul>
Gravel packs and/or screen slots calcified or clogged with oxidised iron or manganese.	<ul style="list-style-type: none"> <li>Regular programme of cleaning gravel packs using compressed air lances</li> </ul>
<b>Event: INFILTRATION GALLERY PRODUCES LESS WATER THAN IT WAS DESIGNED FOR</b>	
Gallery clogged by tree roots.	<ul style="list-style-type: none"> <li>Avoid planting trees near the gallery.</li> </ul>
<b>Event: TOO LITTLE WATER CAN BE DRAWN FROM THE INTAKE TO MEET DEMAND</b>	
Screens damaged or clogged.	<ul style="list-style-type: none"> <li>Regular inspection and cleaning of screens, intensified during times of flood.</li> <li>Booms and screens to trap weed/algae.</li> </ul>
Failure of the intake due to mechanical or structural failure.	<ul style="list-style-type: none"> <li>Regular preventive maintenance, as required by the conditions, and manufacturers' specifications: lubrication, component replacement, exercise valves.</li> <li>Regular inspections of intake.</li> </ul>
Catastrophic failure (eg, flood, slips or	<ul style="list-style-type: none"> <li>Intake inspections, regularly and directly after floods etc, with follow-up action if required for existing protection (eg, gabions, piling, screens and grates, etc).</li> </ul>

Causes	Preventive measures
earthquake-related damage).	
Pump failure	<ul style="list-style-type: none"> <li>• Maintenance according to manufacturers' recommendations.</li> <li>• Standby pump with auto-switch to alternate pumps.</li> <li>• Operate duty and standby pumps using an alternate 'number of days cycle'.</li> </ul>
Power failure.	<ul style="list-style-type: none"> <li>• Regular inspection of cabling, power lines and connectors.</li> <li>• Stand-by generator.</li> </ul>
Vandalism/ sabotage.	<ul style="list-style-type: none"> <li>• Construct a fence around the intake site.</li> </ul>

## **Annexure 16: Emergency Response Plan for Flood Protection Bund**

Flood-fighting measures are emergency measure deployed in the event when flood protection / control structures and flood proofing measures have failed or rendered ineffective with a sole objective of mitigating flood impacts

Reasons of Flooding:

- Failure of flood walls and embankments;
- Failure of land drainage systems causing flooding of agriculture land; and

Emergency Responses for flood-fighting in a typical case of failure of flood protection / control structures include the following:

- Closing of gaps in flood walls by sand bags or other available methods;
- Protection of river banks by sand bags, stone, or other available methods;
- Counteracting piping which is the main cause of collapse of embankment and dykes etc.;
- Construction of temporary non-structural protection measures to prevent the propagation of flood on non-protected land;
- Cutting of embankment, dykes etc. in order to allow flooding of less important areas, and thus to save other more important areas;
- Removing obstacles from active or potential flood ways, relief and flood bypass channels; and
- Protection of structures exposed to strong wind wash action.



## **Annexure 17: Emergency Response Plan for Damage of Weir**

Flood-fighting measures are emergency measure deployed in the event when flood protection / control structures and flood proofing measures have failed or rendered ineffective with a sole objective of mitigating flood impacts.

Reasons of Flooding:

- Failure of dykes, flood walls and embankments;
- Reduced capacity of river channels, flood ways, and flood bypass channels;
- Failure of weirs and barrages with consequent devastating flood waves;
- Failure of land drainage systems causing flooding of agriculture land; and
- Failure of urban drainage systems causing flooding within protected urban area.

Emergency Responses for flood-fighting in a typical case of failure of flood protection / control structures include the following:

- Closing of gaps in flood walls by sand bags or other available methods;
- Protection of river banks by sand bags, stone, or other available methods;
- Counteracting piping which is the main cause of collapse of embankment and dykes etc.;
- Protection of bridge piers, weirs, barrages and dams against erosion by rockfill, sand bags and other available methods;
- Construction of temporary non-structural protection measures to prevent the propagation of flood on non-protected land;
- Cutting of embankment, dykes etc. in order to allow flooding of less important areas, and thus to save other more important areas;
- Removing obstacles from active or potential flood ways, relief and flood bypass channels; and
- Protection of structures exposed to strong wind wash action.

## Annexure 18: Chance Find Procedure

Project routing does not envisage any archaeological site. However, in case of any chance find, the **Construction Contractor** will immediately report through **Chief Resident Engineer** of Supervision Consultant to **Deputy Commissioner (DC)** or his nominated representative, to take suitable further actions to preserve such antiques or sensitive remains; and contact the “**Culture, Tourism & Archives Department, (Archaeology Directorate) Government of Balochistan**” for further action.

Representative of the “**Culture, Tourism & Archives Department, (Archaeology Directorate) Government of Balochistan**” will visit the site and observed the significance of the antique, artifact & Cultural (religious) properties and significance of the project. The site visit report will be prepared and given to the **concerned official** of the **Archaeology Directorate**.

In case any artifact, antiques and sensitive remains are discovered, *Chance Find Procedures* should be adopted by Construction Contractors as follows;

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial archaeological department;
- The suggestion of the local communities and the concerned authorities will be suitable incorporated during taking the preventive measures to conserve the antique, artifact and Cultural (religious) properties;
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the Construction Contractor must immediately report the discovery to the **Chief Resident Engineer** of Supervision Engineer for onwards communication to **Deputy Commissioner (DC)**;
- Once authorization has been given by the responsible authorities (Archaeological Department), the Construction Contractor will be informed when works can resume.

## Annexure 19: The List of Restricted Pesticides

Table 1. Extremely Hazardous (Class Ia) Technical grade Active Ingredients in Pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
carb [ISO]	116-06-3	2757	C	5	I-S	1	0.93	DS 53; EHC 121; HSG 64; IARC 53; ICSC 94; JMPR 1993, 1996a
difacoum [ISO]	56073-10-0	3027	CO	5	R	1	0.3	DS 57; EHC 175; HSG 93
radiolone [ISO]	28772-56-7	3027	CO	5	R	1	1.12	DS 88; EHC 175; HSG 94
methalin [ISO]	63333-35-7	2588		5	R	1	2	
cium cyanide [C]	592-01-8	1575		5	FM	2	39	Adjusted classification; see note 1; ICSC 407
tafol [ISO]	2425-06-1			5	F	5	5000	Adjusted classification; see note 2; HSG 49; IARC 53; ICSC 119; JMPR 1978, 1986a; see note 3
orethoxyfos [ISO]	54593-83-8	3018	OP	L	I	1	1.8	Extremely hazardous by skin contact (LD <sub>50</sub> = 12.5 mg/kg); ICSC 1681
ormephos [ISO]	24934-91-6	3018	OP	L	I	2	7	ICSC 1682
rophacinone [ISO]	3691-35-8	2588		5	R	1	3.1	DS 62; EHC 175
enacoum [ISO]	56073-07-5	3027	CO	5	R	1	1.8	EHC 175; HSG 95
ethialone [ISO]	104653-34-1	2588		5	R	1	0.56	EHC 175
hacinone [ISO]	82-66-6	2588		5	R	1	2.3	EHC 175
ulfoton [ISO]	298-04-4	3018	OP	L	I	1	2.6	DS 68; JMPR 1992, 1997a; ICSC 1408
	2104-64-5	2783	OP	5	I	2	14	See note 4; ICSC 753
oprophos [ISO]	13194-48-4	3018	OP	L	I-S	2	D26	DS 70; JMPR 2000; ICSC 1660; [Oral LD <sub>50</sub> = 33 mg/kg]
coumafen	90035-08-8	3027		5	R	1	0.25	EHC 175; ICSC 1267
achlorobenzene [ISO]	118-74-1	2729	OC	5	FST	5	D10000	Adjusted classification (notes 3 and 5); IARC 79; ICSC 895; EHC 195
rcuric chloride [ISO]	7487-94-7	1624	HG	5	F-S	1	1	See note 3; ICSC 979
vinphos [ISO]	26718-65-0	3018	OP	L	I	1	D4	DS 14; ICSC 924; JMPR 1998b; [Oral LD <sub>50</sub> = 3.7 mg/kg]
athion [ISO]	56-38-2	3018	OP	L	I	2	13	See note 3; DS 6; HSG 74; IARC 30, Suppl. 7; ICSC 6; JMPR 1996b
athion-methyl [ISO]	298-00-0	3018	OP	L	I	2	14	See note 3; DS 7; EHC 145; HSG 75; ICSC 626; JMPR 1985c, 1996b

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
Phenylmercury acetate [ISO]	62-38-4	1674	HG	S	FST	2	24	Adjusted classification; see notes 3 and 6; ICSC 540
Phorate [ISO]	298-02-2	3018	OP	L	I	1	2	DS 75; JMPR 1997b, 2005; ICSC 1060
Phosphamidon	13171-21-6	3018	OP	L	I	2	7	See note 3; DS 74; ICSC 189; JMPR 1987b
Sodium fluoroacetate [C]	62-74-8	2629		S	R	1	0.2	DS 16; ICSC 484
Sulfotep [ISO]	3689-24-5	1704	OP	L	I	1	5	ICSC 985
Tebupirimfos [ISO*]	96182-53-5	3018	OP	L	I	1	1.3	Extremely hazardous by skin contact (LD 9.4 mg/kg in rats)
Terbufos [ISO]	13071-79-9	3018	OP	L	I-S	1	c2	JMPR 1991, 2004

EHC = Environmental Health Criteria Monograph; DS = Pesticide Data Sheet; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of

Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

#### Notes to Class Ia

1. Calcium cyanide is in Class Ia as it reacts with moisture to produce hydrogen cyanide gas. The gas is not classified under the WHO system (see Table 8).
2. Captafol is carcinogenic in both rats and mice.
3. The international trade of captafol, hexachlorobenzene, mercury compounds, parathion, parathion-methyl, and phosphamidon is regulated by the Rotterdam convention on Prior Informed Consent (see <http://www.pic.int/>), which entered into force on 24 February 2004. See Table 7, p. 51
4. EPN has been reported as causing delayed neurotoxicity in hens.
5. Hexachlorobenzene has caused a serious outbreak of porphyria in humans. The use and production of hexachlorobenzene is severely restricted by the Stockholm convention on persistent organic pollutants, which entered into force on 17 May, 2004. See <http://www.pops.int/>
6. Phenylmercury acetate is highly toxic to mammals and very small doses have produced renal lesions: teratogenic in the rat.

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION

See Pages 7 & 8, and the Appendix

Table 2. Highly hazardous (Class Ib) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
Acrolein [C]	107-02-8	1092		L	H	2	29	EHC 127; HSG 67; IARC 63; ICSC 90
Allyl alcohol [C]	107-18-6	1098		L	H	3	64	Highly irritant to skin and eyes; ICSC 95; <i>Adjusted classification (see note 3)</i>
Azinphos-ethyl [ISO]	2642-71-9	2783	OP	S	I	2	12	DS 72; JMPR 1974
Azinphos-methyl [ISO]	86-50-0	2783	OP	S	I	2	16	DS 59; ICSC 826; JMPR 1992, 2009b
Blasticidin-S	2079-00-7	2588		S	F	2	16	
Butocarboxim [ISO]	34681-10-2	2992	C	L	I	3	158	JMPR 1986a; <i>Adjusted classification (see note 3)</i>
Butoxycarboxim [ISO]	34681-23-7	2992	C	L	I	3	D288	<i>Adjusted classification (see note 3)</i>
Cadusafos [ISO]	95465-99-9	3018	OP	L	N,I	2	37	JMPR 1992
Calcium arsenate [C]	7778-44-1	1573	AS	S	I	2	20	EHC 18, 224; IARC 84; ICSC 765; JMPR 1969
Carbofuran [ISO]	1563-66-2	2757	C	S	I	2	8	DS 56; ICSC 122; JMPR 1997b, 2003b, 2009a; <i>See note 2.</i>
Chlorfenvinphos [ISO]	470-90-6	3018	OP	L	I	2	31	ICSC 1305; JMPR 1995b
3-Chloro-1,2-propanediol [C]	96-24-2	2689		L	R	3	112	<i>Adjusted classification (see notes 1 and 3)</i>
Coumaphos [ISO]	56-72-4	2783	OP	S	AC,MT	2	7.1	ICSC 422; JMPR 1991
Coumatetralyl [ISO]	5836-29-3	3027	CO	S	R	2	16	
Cyfluthrin [ISO]	68359-37-5		PY	S	I	2	c15	JMPR 2008; <i>See note 9, p. 8</i>
Beta-cyfluthrin [ISO]	68359-37-5		PY	S	I	2	c11	JMPR 2008; <i>See note 9, p. 8</i>
Zeta-cypermethrin [ISO]	52315-07-8	3352	PY	L	I	3	c86	<i>See note 9, p. 8; HSG 22; ICSC 246; JMPR 2008; Adjusted classification (see note 3)</i>
Demeton-S-methyl [ISO]	919-86-8	3018	OP	L	I	2	40	DS 61, EHC 197; ICSC 705; JMPR 1990
Dichlorvos [ISO]	62-73-7	3018	OP	L	I	3	56	Volatile, DS 2; EHC 79; HSG 18; IARC 20, 53; ICSC 690; JMPR 1994; <i>Adjusted classification (see note 3)</i>
Dicrotophos [ISO]	141-66-2	3018	OP	L	I	2	22	ICSC 872
Dinoterb [ISO]	1420-07-1	2779	NP	S	H	2	25	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
DNOC [ISO]	534-52-1	2779	NP	S	I-S,H	2	25	JMPR 1965a; EHC 220; ICSC 462. See note 2.
Edifenphos [ISO]	17109-49-8	3018	OP	L	F	3	150	JMPR 1982. <i>Adjusted classification (see note 3)</i>
Ethiofencarb [ISO]	29973-13-5	2992	C	L	I	3	200	JMPR 1983. <i>Adjusted classification (see note 3)</i>
Famphur	52-85-7	2783	OP	S	I	2	48	
Fenamiphos [ISO]	22224-92-6	2783	OP	S	N	2	15	DS 92; ICSC 483; JMPR 1998b, 2003b
Flucythrinate [ISO]	70124-77-5	3352	PY	L	I	3	c67	JMPR 1986b; see note 9, p.8; <i>Adjusted classification (see note 3)</i>
Fluoroacetamide [C]	640-19-7	2588		S	R	2	13	ICSC 1434. See note 2
Formetanate [ISO]	22259-30-9	2757	C	S	AC	2	21	
Furathiocarb	65907-30-4	2992	C	L	I-S	2	42	
Heptenophos [ISO]	23560-59-0	3018	OP	L	I	3	96	<i>Adjusted classification (see note 3)</i>
Isoxathion [ISO]	18854-04-8	3018	OP	L	I	3	112	<i>Adjusted classification (see note 3)</i>
Lead arsenate [C]	7784-40-9	1617	AS	S	L	2	c10	EHC 18, 224; IARC 84; ICSC 911; JMPR 1969
Mecarbam [ISO]	2595-54-2	3018	OP	Oil	I	2	36	JMPR 1987a
Mercuric oxide [ISO]	21908-53-2	1641	HG	S	O	2	18	ICSC 981; CICAD 50. See note 2
Methamidophos [ISO]	10265-92-6	2783	OP	S	I	2	30	HSG 79; ICSC 176; JMPR 1991, 2003b; See note 2
Methidathion [ISO]	950-37-8	3018	OP	L	I	2	25	JMPR 1998b; ICSC 1659
Methiocarb [ISO]	2032-65-7	2757	C	S	I	2	20	JMPR 1999
Methomyl [ISO]	16752-77-5	2757	C	S	I	2	17	DS 55, EHC 178; HSG 97; ICSC 177, JMPR 1989, 2002
Monocrotophos [ISO]	6923-22-4	2783	OP	S	I	2	14	See note 2; HSG 80; ICSC 181; JMPR 1996b
Nicotine [ISO]	54-11-5	1654		L		1	D50	ICSC 519
Omethoate [ISO]	1113-02-6	3018	OP	L	I	2	50	JMPR 1997a
Oxamyl [ISO]	23135-22-0	2757	C	S	I	2	6	DS 54; JMPR 1986b, 2003b
Oxydemeton-methyl [ISO]	301-12-2	3018	OP	L	I	3	65	JMPR 1990, 2003b; <i>Adjusted classification (see note 3)</i>
Paris green [C]	12002-03-8	1585	AS	S	L	2	22	Copper-arsenic complex
Pentachlorophenol [ISO]	87-86-5	3155		S	I,F,H	2	D80	See note 2; Irritant to skin; EHC 71; HSG 19; IARC 20, 53; ICSC 69

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
Propetamphos [ISO]	31218-83-4	3018	OP	L	I	3	106	<i>Adjusted classification (see note 3)</i>
Sodium arsenite [C]	7784-46-5	1557	AS	S	R	2	10	EHC 224; IARC 84; ICSC 1603
Sodium cyanide [C]	143-33-9	1689		S	R	2	6	ICSC 1118; CICAD 61
Strychnine [C]	57-24-9	1692		S	R	2	16	ICSC 197
Tefluthrin	79538-32-2	3349	PY	S	I-S	2	c22	See note 9, p. 8
Thallium sulfate [C]	7446-18-6	1707		S	R	2	11	DS 10, EHC 182; ICSC 336
Thiofanox [ISO]	39196-18-4	2757	C	S	I-S	2	8	
Thiometon [ISO]	640-15-3	3018	OP	Oil	I	3	120	DS 67; ICSC 580; JMPR 1980; <i>Adjusted classification (see note 3)</i>
Triazophos [ISO]	24017-47-8	3018	OP	L	I	3	82	JMPR 1994, 2003b; <i>Adjusted classification (see note 3)</i>
Vamidothion [ISO]	2275-23-2	3018	OP	L	I	3	103	JMPR 1989; ICSC 758; <i>Adjusted classification (see note 3)</i>
Warfarin [ISO]	81-81-2	3027	CO	S	R	2	10	DS 35, EHC 175; HSG 96; ICSC 821
Zinc phosphide [C]	1314-84-7	1714		S	R	2	45	DS 24, EHC 73; ICSC 602

EHC = Environmental Health Criteria Monograph; DS= Pesticide Data Sheet; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

#### Notes to Class Ib

1. 3-Chloro-1,2-propanediol in nonlethal dosage is a sterilant for male rats. This compound is also known as alpha chlorhydrin.
2. The international trade of carbofuran, DNOC, fluoroacetamide, mercury compounds, methamidophos, monocrotophos and pentachlorophenol is regulated by the Rotterdam convention on Prior Informed Consent (see <http://www.pic.int/>), which entered into force on 24 February 2004. See Table 7, p. 51.
3. As a precautionary measure, the classification of certain liquid pesticides has been adjusted to avoid those pesticides being assigned to a less hazardous Class in the process of aligning the WHO Classification with the GHS. Details of how the WHO Classification has been aligned with the GHS Acute Toxicity Hazard Categories are described in the introductory notes for Part II.

THE FINAL CLASSIFICATION OF ANY PRODUCT  
DEPENDS ON ITS FORMULATION  
See Pages 7 & 8, and the Appendix

Table 3. Moderately Hazardous (Class II) Technical Trade Active Ingredients in Pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
Acephate [ISO]	30560-19-1		OP	S	I	4	945	JMPR 1991, 2003b, 2006b; ICSC 748
Acifluorfen [ISO]	50594-66-6			S	H	4	1370	Strong irritant to eyes
Alachlor [ISO]	15972-60-8	2588		S	H	4	930	See note 1; DS 86; IARC 19, 36, 63; ICSC 371
Alanycarb [ISO]	83130-01-2		C	S	I	4	330	
Allethrin [ISO]	584-79-2		PY	Oil	I	4	c685	See note 9, page 8; EHC 87; HSG 24; ICSC 212; JMPR 1965a
Ametryn [ISO]	834-12-8		T	S	H	4	110	
Amitraz [ISO]	33089-61-1			S	AC	4	800	ICSC 98; JMPR 1999
Anilofos [ISO]	64249-01-0		OP	S	H	4	472	
Azaconazole	60207-31-0			S	F	4	308	
Azamethiphos [ISO]	35575-96-3		OP	S	I	4	1010	
Azocyclotin [ISO]	41083-11-8	2786	OT	S	AC	3	80	JMPR 1990, 1995b, 2006b
Bendiocarb [ISO]	22781-23-3	2757	C	S	I	3	55	DS 52
Benfuracarb [ISO]	82560-54-1	2992	C	L	I	3	205	
Bensulide [ISO]	741-58-2	2902		L	H	3	270	ICSC 383
Bensultap [ISO]	17606-31-4			S	I	4	1100	
Bentazone [ISO]	25057-89-0			S	H	4	1100	HSG 48; ICSC 828; JMPR 1999, 2005
Bifenthrin	82657-04-3	3349	PY	S	I	3	c55	JMPR 1993
Bilanafos [ISO]	71048-99-2			S	H	3	268	
Bioallethrin [C]	584-79-2		PY	L	I	4	c700	See note 2; note 9, p. 8; ICSC 227
Bromoxynil [ISO]	1689-84-5	2588		S	H	3	190	
Bromuconazole	116255-48-2			S	F	4	365	ICSC 1264
Bronopol	52-51-7			S	B	3	254	ICSC 415
Butamifos [ISO]	36335-67-8		OP	L	H	4	630	
Butralin [ISO]	33629-47-9			S	H	4	1049	



Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
Butoxydim [ISO]	138164-12-2			S	H	4	1635	
Butylamine [ISO]	13952-84-6	1992		L	F	4	380	Irritant to skin; ICSC 401; JMPR 1982, 1985b
Carbaryl [ISO]	63-25-2	2757	C	S	I	3	c300	DS 3; EHC 153; HSG 78; IARC 12, Suppl.7; ICSC 121; JMPR
Carbosulfan [ISO]	55285-14-8	2992	C	L	I	3	250	JMPR 1987a, 2004
Cartap [ISO]	15263-53-3			S	I	4	325	EHC 76; JMPR 1996a
Chloralose [C]	15879-93-3			S	R	4	400	
Chlordane [ISO]	57-74-9	2996	OC	L	I	4	460	See notes 3 and 4; DS 36; EHC 34; HSG 13; IARC 79; ICSC 740; JMPR 1995a
Chlorfenapyr [ISO]	122453-73-0			S	I,MT	4	441	
Chlormequat (chloride) [ISO]	999-81-5			S	PGR	4	670	ICSC 781; JMPR 2000
Chloroacetic acid [C]	79-11-8	1751		S	H	4	650	Irritant to skin and eyes; data refer to sodium salt; ICSC 235
Chlorphonium chloride [ISO]	115-78-6	2588		S	PGR	3	178	Irritant to skin and eyes
Chlorpyrifos [ISO]	2921-88-2	2783	OP	S	I	3	135	DS 18; ICSC 851; JMPR 2000
Clomazone [ISO]	81777-89-1			L	H	4	1369	
Copper hydroxide [C]	20427-59-2		CU	S	F	4	1000	
Copper oxychloride [C]	1332-40-7		CU	S	F	4	1440	
Copper sulfate [C]	7758-98-7		CU	S	F	3	300	ICSC 751
4-CPA [ISO]	122-88-3		PAA	S	PGR	4	850	
Cuprous oxide [C]	1317-39-1		CU	S	F	4	470	ICSC 421, EHC 200
Cyanazine [ISO]	21725-46-2		T	S	H	3	288	ICSC 391
Cyanophos [ISO]	2636-26-2		OP	L	I	4	610	
Cyhalothrin [ISO]	68085-85-8	3352	PY	Oil	Ix	3	c144	See note 9, p. 8; EHC 99; HSG 38; ICSC 858; JMPR 1985c; JECFA 2000b
Cyhexatin [ISO]	13121-70-5		OT	S	AC	3	265	EHC 15; JMPR 1995b, 2006b
Cymoxanil [ISO]	57966-95-7			S	F	4	1196	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD <sub>50</sub> mg/kg	Remarks
Cypermethrin [ISO]	52315-07-8	3352	PY	L	I	3	c250	See note 9, p. 8; DS 58; EHC 82; HSG 22; ICSC 246; JECFA 1996
Alpha-cypermethrin [ISO]	67375-30-8	3349	PY	S	I	3	c79	See note 9, p. 8; EHC 142; JECFA 1996; JMPR 2008
Cyphenothrin [(1R)-isomers] [ISO]	39515-40-7	3352	PY	L	I	4	318	
Cyproconazole	94361-06-5			S	F	4	1020	
2,4-D [ISO]	94-75-7	3345	PAA	S	H	4	375	DS 37; EHC 29, 84; HSG 5; IARC 41, Suppl. 7; ICSC 33; JMPR
Dazomet [ISO]	533-74-4			S	F-S	4	640	Irritant to skin and eyes; ICSC 786
2,4-DB	94-82-6			S	H	4	700	
DDT [ISO]	50-29-3	2761	OC	S	I	3	113	See notes 3 and 4; DS 21; EHC 9, 83; IARC 53; ICSC 34; JMPR
Deltamethrin [ISO]	52918-63-5	3349	PY	S	I	3	c135	See note 9, p. 8; DS 50; EHC 97; HSG 30; IARC 53; ICSC 247; JMPR 2001
Diazinon [ISO]	333-41-5	3018	OP	L	I	4	300	DS 45, EHC 198; ICSC 137; JMPR 1994, 2002, 2008
Dicamba [ISO]	1918-00-9			S	H	4	1707	ICSC 139
Dichlorobenzene [C]	106-46-7			S	FM	4	500-5000	Mixture of isomers: ortho (3) 95-50-1, meta (3) 541-73-1, para (2B)
Dichlorophen [ISO]	97-23-4		OC	S	F	4	1250	
Dichlorprop [ISO]	7547-66-2			S	H	4	800	ICSC 38
Diclofop [ISO]	40483-25-2			S	H	4	565	
Dicofol [ISO]	115-32-2		OC	S	AC	4	c690	DS 81; IARC 30; ICSC 752; JMPR 1993
Difenoconazole [ISO]	119446-68-3			S	F	4	1453	JMPR 2009b
Difenzoquat [ISO]	43222-48-6	2588		S	H	4	470	
Dimepiperate [ISO]	61432-55-1		TC	S	H	4	946	
Dimethachlor [ISO]	50563-36-5			S	H	4	1600	
Dimethipin [ISO]	55290-64-7			S	H	4	1180	JMPR 2000, 2005

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