Formato para presentar, con arreglo al artículo 8 del Convenio de Estocolmo, la información que se señala en el anexo E del Convenio

Información introductoria	
Nombre de la Parte/observador que presenta la información	
Señas (nombre, número de teléfono, dirección de correo electrónico) del enlace de la Parte/observador que presenta la información	
Nombre químico (utilizado por el Comité de Examen de COP)	**Endosulfan**
Fecha de presentación	

a) Fuentes, incluyendo, cuando proceda (proporcione información resumida y las referencias que corresponda)

i) Datos de producción:

Cantidad

Lugar

Otros

According to the information provided by the Mexican Ministry of Economy, the information about endosulfan exportation and importation in Mexico in recent years is summarized in tables 1 and 2.

Table 1. Endosulfan exports (kg) in Mexico (1)

Country	2007	2008
Guatemala	0	1000

Table 2. Endosulfan imports (kg) in Mexico (1)

País	2007	2008
Israel	25,200	40,000
India	54,000	20,000
Germany	94,500	13,500
Total	173,700	73,500

Additional information points out the importation of this pesticide in previous years from France, Italy and Singapore (2).

(1) Fernández, A., Yarto, M., Castro, J. (2004). Las sustancias tóxicas persistentes. Instituto Nacional de Ecología. Secretaría de Medio Ambiente y Recursos Naturales.

(2) SIAVI, 2008. Sistema de Información Arancelaria Via Internet. Secretaría de Economía. Fecha de consulta: 4 de agosto de 2008. http://www.economia-snci.gob.mx:8080/siaviWeb/siaviMain.jsp

ii) Usos

Endosulfan has been registered in Mexico for agricultural and industrial uses. For agriculture the specific uses authorized are: foliage application in alfalfa (lucerne), cotton, celery, eggplant (aubergine), broccoli, coffee, squash, pumpkin, safflower, sugar cane, barley, apricot, pea, chili plum, cabbage, Brussels cabbage, cauliflower, rutabaga, peach, strawberry, bean, tomato, lettuce, corn, apple, melon, turnip, walnut, American walnut, ornamental plants, potato, grass, cucumber, pear, pineapple, watermelon, tobacco, green tomato, wheat y vine. For industry only the exclusive use in formulation plants is authorized (3).

Endosulfan products in Mexico are registered with the following commercial names: Agrofan; Agrosulfan; Algodan; Biestelfan/Endopro/Endomax, Biosulfan; Derfan or Fanmet; Destroy/Panther; Endo; Endocoral, Endofan, Endopol, Endos, Endosulfán, Fantom, Gowan Endosulfán, Hornet, Lucasulfan, Misulfan/Agrosulfan/Agrisulfan; Nasadan, Plagui-Dan, Poderoso, Posulfan, Pronex, Sufan, Sultan, Tacsafan, Thio-Vac, Thiocar,

	Thiodan/Phaser/Capataz/Gala, Thiodan, Thiodan/Gala/Capataz/Phaser, Thiofixan, Thiomet, Thionex, Thiosul, Thiosulfan, Toxidian, Tridane Tridente, Usulfan/Tiokil/Endokill/Policia, Usulfan, Veldosulfan and Zoll (3). According to the Mexican Health Ministry (Federal Comissition of Sanitary Risk Protection) until 2008 95 endosulfan products have been registered (4). (3) CICOPLAFEST, 2004. Catálogo Oficial de Plaguicidas. Comisión Intersecretarial para el Control del Proceso y Uso de Plaguicidas Fertilizantes y Sustancias Tóxicas. (4) COFEPRIS, 2008. Registros de plaguicidas autorizados por categoría toxicológica. Comisión Federal de Protección contra Riesgos Sanitarios. Comisión de Autorización Sanitaria. Julio de 2008. http://www.cofepris.gob.mx/cis/tramites/infpynv/RegPlag.pdf
iii) Liberaciones: **Descargas** **Pérdidas** **Emisiones** **De otro tipo**	

b) Evaluación del peligro para los puntos terminales que sean motivo de preocupación, incluido un examen de las interacciones toxicológicas en las que intervenga más de un producto químico (proporcione información resumida y las referencias que corresponda)

The coastal lagoon system of Laguna de Terminos, Campeche, Mexico, a natural reserve since 1994, was investigated for contamination by agricultural and industrial chemical residues. Water, sediment and biota samples were analyzed for a wide variety of organochlorine and organophosphorus compounds. Results show that the more widespread contaminants in the Laguna were residues of chlorinated hydrocarbons, such as DDTs, PCBs, endosulfan, and lindane. Concentrations of residues were not at an alarming level and were even lower than reported for other costal lagoons of the region.

Carvalho FP, Villeneuve JP, Cattini C, Rendón J, Mota de Oliveira J. 2008. Pesticide and PCB residues in the aquatic ecosystems of Laguna de Terminos, a protected area of the coast of Campeche, Mexico. Chemosphere. Nov 18. [Epub ahead of print]. (Nuclear and Technological Institute, Department of Radiological Protection and Nuclear Safety, E.N. 10, 2686-953 Sacavém, Portugal)

A solid phase extraction and gas chromatography with negative chemical ionization mass spectrometry in scan mode (GC-NCI-MS) method was developed to identify and quantify for the first time low levels of organochlorine pesticides (OCs) in plasma samples of wild birds (*Falco sparverius*, *Sturnella negelcta*, *Mimus polyglottosand* and *Columbina passerina*) from cultivated areas of central Baja California Sur, Mexico. Levels of endosulfan I, endosulfan II and endosulfan sulfate ranged between n/d* to 3.149, n/d to 6.484 and n/d to 3.149 pg·μL^{-1}, respectively (The method detection limit and method reporting limit for endosulfan I were 0.027 and 0.081 pg·μL^{-1}, for endosulfan II were 0.019 and 0.056 pg·μL^{-1}, and for endosulfan sulfate were 0.054 and 0.163 pg·μL^{-1}. [* = not detected]

Rivera-Rodríguez LB, Rodríguez-Estrella R, Ellington JJ, Evans JJ. 2007. Quantification of low levels of organochlorine pesticides using small volumes (<or=100 microl) of plasma of wild birds through gas chromatography negative chemical ionization mass spectrometry. Environ Pollut. 148(2):654-62. Epub 2007 Jan 19. (Centro de Investigaciones Biológicas del Noroeste, S.C., Environmental Planning and Conservation Program, Mar Bermejo No. 195, Col. Playa Palo de Santa Rita, Ado. Postal 128, La Paz, BCS. 23090, México. lrivera04@cibnor.mx)

Organochlorine pesticides were measured in the ambient air of a community in the proximity of Tapachula, Chiapas, Mexico during 2000-2001. In these samples concentrations of endosufan I ranged from 73 to 1373 pg·m^{-3}.

Alegria H, Bidleman TF, Figueroa MS. 2006. Organochlorine pesticides in the ambient air of Chiapas, Mexico. Environ Pollut. 140(3):483-91. Epub 2005 Oct 3. (Chemistry Department, California Lutheran University, 60 West Olsen Road, Thousand Oaks, CA 91360, USA. halegria@clunet.edu)

Endosulfan II has been detected in sediment and fish (*Ariopsis felis* and *Hexanematichthys assimilis*) liver samples from three costal lagoons (Celestún, Laguna de Términos and Bocas de Dzilam) of Yucatan Peninsula, Mexico.

Gold Bouchot G, Zapata Pérez O, Ceja Moreno V, Rodas Ortiz JP, Dominguez Maldonado JA, Del Rio M, Rodríguez F, Ku Chan PM and Espínola Panti DY. 2005. Diagnóstico Regional de los Contaminantes Orgánicos Persistentes (COPs) en la Zona Costera de la Península de Yucatán y el Sur del Golfo de México. Informe Final. Instituto Nacional de Ecología-SEMARNAT, México. (http://www.ine.gob.mx/dgicur/sqre/descargas/2005_inf_final_yuc_sur_golfo.pdf)

The water quality of the Pozuelos-Murillo lagoon system in southern Mexico was evaluated during three periods between March and October 2002, with particular emphasis on the detection of organochlorine and organophosphorous pesticide residues in water and sediments. Residues of endosulfan I (814 ng g^{-1}) in sediments were detected by solid phase micro-extraction followed by gas chromatography. The spatial distribution of this contaminant implies major potential risks because the most polluted sites were found to be those with the highest fishing activity.

Hernández-Romero AH, Tovilla-Hernández C, Malo EA, Bello-Mendoza R. 2004. Water quality and presence of pesticides in a tropical coastal wetland in southern Mexico. Mar Pollut Bull. 48(11-12):1130-41. (El Colegio de la Frontera Sur, Carretera Antiguo Aeropuerto km 2.5, Tapachula, Chiapas 30700, Mexico)

Analyses of pesticide residues in sediments, water and biota of the Altata-Ensenada del Pabellón coastal lagoon system in Sinaloa, Mexico, showed the presence of organochlorine and organophosphorus compounds. Among the organochlorines, total DDTs displayed the largest sedimentary reservoir, followed by total endosulfans and chlorpyrifos. Endosulfan is currently used in the region and endosulfan residues in lagoon sediments attained levels considered to be toxic to meiofauna, therefore constituting an ecological risk to lagoon ecosystems.

Carvalho FP, Gonzalez-Farias F, Villeneuve JP, Cattini C, Hernandez-Garza M, Mee LD, Fowler SW. 2002. Distribution, fate and effects of pesticide residues in tropical coastal lagoons of northwestern Mexico. Environ Technol. Nov. 23(11):1257-70. (International Atomic Energy Agency, Marine Environment Laboratory, BP 800, MC98012 Monaco)

This work presents the content of organochlorine pesticides in sediments of both, agricultural drains from the Irrigation District 076, El Carrizo, Sinaloa, and of the adjacent coastal lagoon ecosystem of Agiabampo-Bacorehuis-Jitzamuri, located in northwest Mexico. The presence of alpha-endosulfan, beta-endosulfan and endosulfan sulfate was recorded in the sediment sample. The analysis of the sediments suggest that the principal pesticides input to the coastal ecosystem is mainly through three of the seven agricultural drains, that collect the excess irrigation water and runoff from the district surface.

González-Farias F, Cisneros Estrada X, Fuentes Ruíz C, Diaz González G, Botello AV. 2002. Pesticides distribution in sediments of a tropical coastal lagoon adjacent to an irrigation district in northwest Mexico. Environ Technol. 23(11):1247-56. (Institute of Marine Sciences and Limnology, National Autonomous University of Mexico, PO Box 811, Mazatlan, Sin., Mexico 82000)

In December 1997 and April and September 1998, water temperature, salinity, dissolved oxygen, nutrients, chlorophyll, and pesticide residues were determined in two coastal ecosystems of Sinaloa, NW Mexico: Ensenada del Pabellón and Bahía de Santa María. The pesticides more frequently detected were BHCalpha, aldrin, endosulfan and parathion. These results indicate that the ecosystems studied are in a warning condition, because severe biochemical and physiological alterations have been reported in crustaceans exposed to pesticides. Therefore these pesticides could be one cause of the slow growth, diverse pathologies, and mortality in shrimp that have been reported in recent years.

Reyes GG, Villagrana L C, Alvarez GL. 1999. Environmental conditions and pesticide pollution of two coastal ecosystems in the Gulf of California, Mexico. Ecotoxicol Environ Saf. 44(3):280-6. (Facultad de Ciencias del Mar, Universidad Autónoma de Sinaloa, Paseo Claussen s/n, Mazatlán, Sinaloa, 8200, México)

Eight species of birds (129 individuals) were collected from three agricultural areas with long histories of pesticide use in northwestern Mexico. Plucked carcasses were analyzed for organochlorine pesticides and polychlorobiphenyls. Endosulfan was found at low levels and low frequency.

Mora MA, Anderson DW. 1991. Seasonal and geographical variation of organochlorine residues in birds from northwest Mexico. Arch Environ Contam Toxicol. 21(4):541-8. (Department of Wildlife and Fisheries Biology, University of California Davis 95616)

c) Destino en el medio ambiente (proporcione información resumida y las referencias que corresponda)

Propiedades fisicoquímicas	
Persistencia	Kinetic studies of endosulfan photochemical degradation in controlled aqueous systems were carried out by ultraviolet light irradiation at lambda = 254 nm. Preliminary differential pulse polarographic (DPP) analysis allowed to observe the possible endosulfan photochemical degradation pathway. This degradation route involves the formation of the endosulfan diol, its transformation to endosulfan ether and finally the ether's complete degradation.

¿Cómo se vinculan la persistencia y las propiedades fisicoquímicas con su transporte en el medio ambiente, su transferencia dentro de segmentos del medio ambiente y entre ellos, su degradación y su transformación en otros productos químicos?	
Bioconcentración o el factor de bioacumulación, sobre la base de valores medidos (salvo que se estime que los datos de vigilancia satisfacen esa necesidad)	

d) Datos de vigilancia (proporcione información resumida y las referencias que corresponda)

e) Exposición en zonas locales (proporcione información resumida y las referencias que corresponda)	
- general	Experimental data showed that an acute exposure to endosulfan (4.0 and 7.0 microg/L) induces a significant decrease in the phagocytic index and the percentage of active cells in peripherical blood of Nile tilapia. However, hemoglobin concentration, hematocrit, red blood cell count, mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration were not significantly altered in fish exposed to endosulfan compared with control group. Girón-Pérez MI, Montes-López M, García-Ramírez LA, Romero-Bañuelos CA, Robledo-Marenco ML. 2008. Effect of sub-lethal concentrations of endosulfan on phagocytic and hematological parameters in Nile tilapia (*Oreochromis niloticus*). Bull Environ Contam Toxicol. 80(3):266-9. Epub 2008 Feb 22. (Laboratorio de Inmunotoxicología, Posgrado CBAP, Universidad Autónoma de Nayarit, Cd de la Cultura Amado Nervo, Tepic, Nayarit, Mexico. ivangiron@nayar.uan.mx) A study was developed to asses the acute toxicity in white shrimp (*Litopenaeus vannamei*) postlarvae exposed to endosulfan, under laboratory conditions during 168 hours, with controlled temperature (29 ± 1 °C), salinity (3 ± 1‰) and pH (8 ± 1). Growth rate decreased 50% with endosulfan exposure experimental concentrations tested. Castro-Castro V, Siu-Rodas Y, González-Huerta LV, Sokolov MY. 2005. Toxic effect of DDT and endosulfan in white shrimp postlarvae *Litopenaeus vannamei* (Decapoda: Penaeidae) from Chiapas, Mexico. Rev Biol Trop. 53(1-2):141-51. (Laboratorio de Ecología Microbiana Aplicada, Departamento de Biotecnología Ambiental, El Colegio de la Frontera Sur, Unidad Tapachula. Apdo. Postal 36, Tapachula, Chiapas, México. cvicente@tapecosur.edu.mx) Shrimp larvae were exposed to DDT, azinphosmethyl, permethrine, parathion, chlorpyrifos, malathion, endosulfan, and carbaryl, in order to determine LC_{50}, DNA adducts or breaks, and total protein in larvae. The results indicate reductions in protein and DNA in larvae exposed to these pesticides. Galindo Reyes JG, Leyva NR, Millan OA, Lazcano GA. 2002. Effects of pesticides on DNA and protein of shrimp larvae *Litopenaeus stylirostris* of the California Gulf. Ecotoxicol Environ Saf. 53(2):191-5. (Facultad de Ciencias del Mar, Universidad Autónoma de Sinaloa, Paseo Claussen s/n, Mazatán, Sin. C.P. 82000 Mexico) A study was developed to asses if low-level, repeated exposure of adult rats to

	commercial formulations containing Endosulfan (ES) and methyl parathion (MP) disrupts spatial learning in the water maze. Five groups of eight animals received subcutaneously appropriate dilutions of the commercial formulations to yield the following treatments during 10 days: saline, 25 mg/kg ES, 2 mg/kg MP (MP(2)), 25 mg/kg ES plus 1 mg/kg MP (ES+MP(1)) and 25 mg/kg ES plus 2 mg/kg MP (ES+MP(2)). In addition, markers of neurological function, renal and hepatic damage were explored as potential consequences of exposure. In the absence of overt toxicity, the groups exposed to the ES plus MP showed significantly longer escape latencies, higher number of failures to reach the platform and more time in the periphery of the tank than the control and single-exposed groups. This finding shows that commercial formulations of ES and MP have marginal effects when administered individually but can produce behavioral alterations when given in combination. Castillo CG, Montante M, Dufour L, Martínez ML, Jiménez-Capdeville ME. 2002. Behavioral effects of exposure to endosulfan and methyl parathion in adult rats. Neurotoxicol Teratol. 24(6):797-804. (Department of Biochemistry, Faculty of Medicine, University of San Luis Potosí, Av. Venustiano Carranza 2405, Mexico)
- como resultado del transporte a larga distancia en el medio ambiente **- información sobre la disponibilidad biológica**	

f) Evaluaciones de los riesgos nacionales e internacionales, valoraciones o perfiles de riesgos e información de etiquetado y clasificaciones del peligro, cuando existan (proporcione información resumida y las referencias que corresponda)

g) Situación del producto químico en el marco de los convenios internacionales