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COMITÉ EJECUTIVO DEL FONDO MULTILATERAL
PARA LA APLICACIÓN DEL
PROTOCOLO DE MONTREAL
Cuadragésima Tercera Reunión
Ginebra, 5 al 9 de julio de 2004

PROPUESTA DE PROYECTO: CHINA

Este documento consta de los comentarios y las recomendaciones de la Secretaría del Fondo sobre la siguiente propuesta de proyecto:

Agentes de proceso

• Plan sectorial de eliminación de SAO en aplicaciones de agentes de proceso químicos y producción de tetracloruro de carbono: Programa anual para 2004	Banco Mundial

PLAN SECTORIAL PARA LA ELIMINACIÓN DEL TETRACLORURO DE CARBONO Y LOS AGENTES DE PROCESO EN LA REPÚBLICA POPULAR CHINA (FASE I):

Verificación del Programa de trabajo anual para 2003 y Programa anual para 2004

Antecedentes

1. En la 38ª Reunión de noviembre de 2002, el Comité Ejecutivo aprobó en principio 65 millones $EUA para el Acuerdo con la República Popular China para eliminar la producción y el consumo de tetracloruro de carbono (CTC), y el consumo de CFC-113 (fase I), y desembolsó en esa reunión el primer tramo de 2 millones $EUA para iniciar la ejecución. China se comprometió a cumplir con el calendario de eliminación del Protocolo de Montreal para la producción y el consumo de tetracloruro de carbono mediante la aplicación de dicho Acuerdo. Posteriormente, en la 39ª Reunión de marzo de 2003 el Comité Ejecutivo aprobó el programa anual para 2003 con un nivel de financiación de 20 millones $EUA.

2. El Banco Mundial presentó el proyecto de programa anual para 2004 a la 41ª Reunión, señalando que en la 42ª Reunión se solicitaría el 3er. tramo de financiación, de 16 millones $EUA, así como 1,2 millón $EUA en costos de apoyo. En el examen de la notificación, el Comité Ejecutivo pidió al Banco Mundial que presentara a la 42ª Reunión un programa de trabajo para 2004, junto con el informe de verificación del programa de trabajo anual para 2003.

3. El Comité pidió que el programa de trabajo para 2004 revisado incluyera información sobre el desembolso de fondos y más detalles acerca del programa de trabajo para 2004, tal como la cantidad de instalaciones de producción de tetracloruro de carbono que se cerrarían, la cantidad de empresas que consumen tetracloruro de carbono que se cerrarían, la cantidad de empresas en las que se realizaría una conversión a tecnologías alternativas y sujetas a control de emisiones, así como un desglose de las reducciones de tetracloruro de carbono relacionadas con cada categoría. También se pidió al Banco Mundial que presentara a la 42ª Reunión un sistema de supervisión para la ejecución del plan sectorial para el tetracloruro de carbono revisado que incluyera indicadores para la verificación del logro de metas para la producción y el consumo de tetracloruro de carbono en el sistema de supervisión propuesto (Decisión 41/62).

4. Sin embargo, a efectos de presentar una verificación completa tanto de la producción como del consumo de tetracloruro de carbono, el Banco Mundial solicitó el acuerdo del Comité Ejecutivo en la 42ª Reunión para presentar el informe de verificación a la 43ª Reunión. El Banco Mundial presenta a esta reunión la verificación completa de la producción y el consumo de tetracloruro de carbono y CFC-113 para 2003 (adjunta), el programa de trabajo para 2004 revisado y el sistema de supervisión revisado (adjunto).

5. Para facilitar las referencias, se reproducen a continuación los objetivos de eliminación del Acuerdo sobre el tetracloruro de carbono.

		Consumo básico de referencia[1/]	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
		Toneladas PAO										
1.	Suma de producción e importaciones de CTC máxima admisible	86 280	64 152	64 152	61 514	54 857	38 686	32 044	26 457	23 583	17 592	11 990
2.	Materia prima de CTC	N/D	55 319	45 400	45 333	39 306	28 446	21 276	15 129	11 662	5 042	-
3.	Consumo máximo admisible de CTC para otras aplica-ciones como agente de proceso [2/]	N/D	N/D	7 389	7 832	8 302	8 800	9 328	9 888	10 481	11 110	11 997
4.	Consumo máximo de CTC admisible en las aplicaciones como agente de proceso indicadas en el Apéndice 2	3 825	4 347	5 049	5 049	5 049	493	493	493	493	493	220
5.	Otros usos no identificados	N/D	N/D	6 314	3 300	2 200	947	947	947	947	947	-
6.	Consumo máximo admisible de CFC-113 en el sector de agentes de proceso	17,2	17,2	17,2	17,2	14	14	10,8	8,4	0	0	0
7.	**APOYO DEL FONDO MULTILATERAL (en miles de $EUA)**					**Total $EUA**						
8.	Financiación Fondo Multilateral			2 000	20 000 [3/]	16 000 [3/]	2 000[3/]	16 000 [3/]	5 000[3/]	3 000[3/]	1 000[3/]	65 000
9.	Costos de apoyo de organismo			150	1 500	1 200	150	1 200	375	225	75	4 875

[1/] El consumo básico de referencia incluye el consumo promedio de tetracloruro de carbono en el período 1998-2000.

[2/] Aplicaciones mencionadas en el Apéndice IV.

[3/] Sujeto a la consideración del calendario de desembolsos durante la 39ª Reunión del Comité Ejecutivo.

Verificación de la producción y el consumo de tetracloruro de carbono y el CFC-113 en 2003

6. La verificación de la producción y el consumo de tetracloruro de carbono y el CFC-113 en 2003 consta de tres partes: verificación de la producción de tetracloruro de carbono, verificación del consumo de tetracloruro de carbono y CFC-113 en el sector de agentes de proceso y un resumen de las verificaciones.

Verificación de la producción de tetracloruro de carbono en 2003

7. La verificación de la producción fue llevada a cabo en mayo de 2004 por un equipo de tres personas: dos expertos técnicos y un analista financiero. El equipo visitó a 12 de los 15 productores de tetracloruro de carbono de China, ya que los tres restantes estaban cerrados.

Además, el equipo también visitó dos plantas que usaban tetracloruro de carbono como materia prima para la producción de sustancias químicas que no agotan la capa de ozono. La Tabla 1 de informe presenta la lista de las plantas visitadas, con el nombre de la planta, el cupo de producción emitido, la producción verificada en 2003 y la situación de la planta.

8. En cada una de las plantas, la verificación recopiló la siguiente información: historia de la planta, tal como fecha de construcción, cantidad de líneas de producción de tetracloruro de carbono, capacidad y producción básica para 2002 y 2001; proceso de producción de la planta, cupo de producción para 2003; registros de producción y transferencia diarios; existencias mensuales de tetracloruro de carbono; y tetracloruro de carbono empacado para la venta sobre la base de los registros de transferencia diarios del almacén de producto.

9. El equipo de verificación también examinó el consumo de materias primas, cloro y materias primas orgánica, tal como metano, metanol y etileno sobre la base de los registros de transferencia de turnos diarios y las existencias iniciales y finales en los inventarios de producción mensual. Además, el equipo también calculó la razón de producción de tetracloruro de carbono output ratio y la razón de consumo de materia prima, y los comparó con los valores teóricos a fin de determinar si los valores habían variado dentro de un intervalo razonable o no.

10. Dado que la producción de productos de clorometano genera diversos subproductos, el equipo también recopiló información acerca de subproductos tales como cloruro de metilo, cloruro de metileno, cloroformo y percloroetileno.

11. Al mismo tiempo, el analista financiero del equipo examinó la confiabilidad del sistema de contabilidad, las facturas de compras y los registros de ventas.

12. A continuación, el informe de verificación proporciona detalles acerca de la verificación realizada en cada planta. Incluye verificación de la producción, las existencias y las ventas de tetracloruro de carbono, el suministro y el consumo de cloro, el suministro y el consumo de metano, metanol y etileno, según la tecnología aplicada en la planta y la presentación de los resultados en forma tabular, con la producción de tetracloruro de carbono, los subproductos de clorometano generados, el consumo de materias primas y las respectivas razones. La verificación de cada planta concluye con una evaluación acerca de si la planta cumplió con el cupo de producción asignado para 2003. El informe finaliza con el formato de las directrices para verificar la eliminación del consumo de SAO, que incluye información acerca del nivel de producción, consumo y relación de materias primas, cantidad de días de funcionamiento y movimiento mensual de las existencias de materias primas.

13. Además, el equipo de verificación también visitó a dos usuarios de tetracloruro de carbono como materia prima, la compañía agroquímica Juhua Lanxi y la compañía química Yongkang Sanhaun. El primero de éstos usa tetracloruro de carbono como materia prima para la producción de ácido cinámico, y el segundo usa tetracloruro de carbono como materia prima para la producción de 3,3,3-trifluoropropano (TFP). El informe describe, para cada planta, el proceso de la tecnología, la producción de los productos finales, ventas y existencias, así como suministro, consumo y existencias de tetracloruro de carbono. La descripción concluye con el consumo verificado de tetracloruro de carbono de cada planta.

14. Finalmente, la verificación arriba a la conclusión de que China produjo en total 56 230,87 toneladas métricas de tetracloruro de carbono en comparación con el cupo emitido de 56 292 toneladas métricas para 2003.

15. La Secretaría, de conformidad con la práctica establecida respecto de la presentación de verificación de la producción, no incluye la parte con los datos. No obstante, dichos datos están a disposición de todo los miembros del Comité Ejecutivo a pedido.

Verificación del consumo de tetracloruro de carbono y CFC-113 en el sector de agentes de proceso en 2003

16. La verificación del consumo de tetracloruro de carbono y CFC-113 se realizó en mayo de 2004, y estuvo a cargo de un equipo de dos personas, un experto técnico y un oficial de operaciones. El equipo visitó a 23 empresas; se incluye una lista de las empresas visitadas, con información acerca del nombre de la planta, existencias iniciales y finales, compras y consumo de tetracloruro de carbono o CFC-113.

17. La verificación incluyó una visita a las líneas de producción, los almacenes de materias primas y productos terminados, así como un examen de los registros financieros de la compra de materias primas y recibos de impuestos al valor agregado. El equipo también examinó de manera aleatoria un registro de producción mensual y de producción diaria.

18. El informe proporciona un resumen de cada una de las empresas visitadas, que incluye una descripción de la empresa, la verificación realizada y las conclusiones. Las conclusiones usualmente incluyen una descripción de las existencias iniciales y finales y de las compras de tetracloruro de carbono, con un cálculo final del consumo de tetracloruro de carbono para el año. También se suministra un cálculo de la producción actual de productos terminados de la planta, obtenido por medio del examen del movimiento de los inventarios.

19. La verificación llega a la conclusión de que el consumo total de tetracloruro de carbono como agente de proceso en 2003 fue de 2 800,4 toneladas métricas, y el consumo total de CFC-113 fue de 21,39 toneladas métricas.

Resumen de los informes de verificación

20. El resumen de la verificación presenta una descripción general resumida de la producción y el consumo de tetracloruro de carbono en comparación con los objetivos establecidos en el Acuerdo aprobado en la 38ª Reunión. Incluye una sección sobre la verificación de la producción de tetracloruro de carbono, una sección sobre el uso de tetracloruro de carbono como materia prima de parte de los productores de CFC, una sección sobre el consumo de tetracloruro de carbono como materia prima para la producción de sustancias químicas que no agotan la capa de ozono, una sección acerca del uso del tetracloruro de carbono use como agente de proceso para las aplicaciones cubiertas por el plan sectorial (fase I), la importación y exportación de tetracloruro de carbono y, finalmente, una evaluación general de la producción y el consumo de tetracloruro de carbono en China en 2003 aplicando las definiciones de producción y consumo del Protocolo de Montreal.

Programa de trabajo anual para 2004 revisado

21. El Banco Mundial volvió a presentar el plan de trabajo anual para 2004 tal como se había presentado a la 41ª Reunión y afirmó que no era posible conocer la cantidad de plantas de tetracloruro de carbono plantas a ser convertidas o cerradas hasta que no se llevará a cabo la ejecución, y que estaba dispuesto a presentar una actualización acerca de la ejecución en la reunión del Comité Ejecutivo.

22. Si bien no se reproduce el programa de trabajo anual para 2004 para economizar recursos, dicho programa está disponible a pedido. Sin embargo, se presenta a continuación un resumen de los elementos clave del programa.

Objetivos e impacto del programa anual para 2004

Consumo	
Tetracloruro de carbono para 25 aplicaciones como agente de proceso	
2003	5 049 toneladas PAO
2004	5 049 toneladas PAO
Impacto	0
CFC-113 para solventes	
2003	17,2 toneladas PAO
2004	14 toneladas PAO
Impacto	3,2 toneladas PAO
Producción	
Tetracloruro de carbono	
2003	61 514 toneladas PAO
2004	54 857 toneladas PAO
Impacto	6 657 toneladas PAO
CFC-113	
2003	17,2 toneladas PAO
2004	14 toneladas PAO
Impacto	3,2 toneladas PAO
Total de financiación aprobada en principio por el Fondo Multilateral	65 millones $EUA
Total de financiación liberada hasta octubre de 2003	22 millones $EUA
Nivel de financiación solicitado	16 millones $EUA

23. El programa anual para 2004 cubre los objetivos previstos y las actividades propuestas a ser realizadas para alcanzar dichos objetivos. En el nivel de las políticas, el Gobierno prevé introducir un Sistema de Licencias de Venta de Tetracloruro de Carbono con el fin de controlar el consumo ilícito. Con dicho sistema, se requerirá a los productores y proveedores de tetracloruro de carbono que informen trimestralmente los nombres de los usuarios finales de tetracloruro de carbono, así como la cantidad y el uso de cada empresa. En el nivel de las empresas, se asignarán cupos a los productores hasta el establecido en el Acuerdo. Se espera que todas las empresas que hayan optado por el cierre completen la clausura y desmantelamiento en 2004; aquellas que realizarán una conversión a una tecnología alternativa, comenzarán la ejecución en 2004 y la finalizarán en 2005. Los contratos para control de emisiones de los fabricantes de poliolefina clorosulfonada se firmarán y aplicarán hacia fines de 2004. Se prevé brindar capacitación a los productores, consumidores, agentes y auditores de tetracloruro de carbono. Continuará la supervisión diaria en el sitio de los productores de tetracloruro de

carbono y, además de la verificación independiente gestionada por el Banco Mundial, la oficina de auditoría estatal realizará en 2004 una auditoría de desempeño.

24. La Tabla 2 presenta los objetivos para el programa anual para 2004 e incluye datos sobre producción, consumo, una comparación de los datos para 2003 y 2004, la reducción a obtener, el nivel de financiación para cada categoría de actividad, indicadores de supervisión según las acciones clave y un cronograma. La Tabla 3 presenta un desglose de financiación por acción de políticas y actividades de empresas dentro de las dos categorías de producción y consumo, con acciones clave y fechas de terminación. La Tabla 4 proporciona detalles acerca del programa de asistencia técnica para 2004, con financiación, acciones y fechas de terminación. Para resumir, de la financiación de 16 millones $EUA para el programa anual para 2004, China prevé asignar 15,2 millones $EUA a actividades relacionadas con las políticas y las empresas y 0,8 millones $EUA a asistencia técnica. El Anexo I presenta la situación de todos los productores de tetracloruro de carbono de China, con el nivel de producción de 2002. El Anexo II presenta una lista de empresas que consumen tetracloruro de carbono con datos sobre aplicaciones, productos y consumo anual de tetracloruro de carbono desde 1997 hasta 2002.

Marco de verificación para la supervisión de la aplicación de los acuerdos sobre tetracloruro de carbono en China e India

25. El marco de verificación propuesto se aplica a ambos países y observa las definiciones de producción y consumo del Protocolo de Montreal como base para la verificación de datos. Por "producción" se entiende la cantidad de sustancias controladas producidas menos la cantidad de sustancias destruidas mediante técnicas aprobadas (o a ser aprobadas) por las Partes y menos la cantidad enteramente utilizada como materia prima en la fabricación de otras sustancias químicas. La cantidad reciclada y reutilizada no se considera "producción". Por “consumo” se entiende la producción más las importaciones menos las exportaciones de sustancias controladas, y la verificación cubrirá tanto la importación como la exportación.

26. El marco se basa sobre las directrices para la verificación de la producción de CFC, pero introduce cambios a fin de ajustarse a las características específicas de la producción de tetracloruro de carbono. Se ocupa de los procedimientos a seguir y se proponen diversas medidas para la verificación tanto de la producción como del consumo de tetracloruro de carbono:

a) Verificación de la producción total de tetracloruro de carbono por medio del examen de la producción de tetracloruro de carbono de los productores. Esto incluirá el análisis de los registros de producción así como del consumo de materias primas, del mismo modo que para la verificación de la producción de CFC;

b) El consumo de tetracloruro de carbono como materia prima se verificará con las aplicaciones que los Gobiernos de India y China consideran que se encuadran en esta categoría (por ejemplo, producción de CFC y DV ácido clorhídrico para la India). Todos los nuevos usos de tetracloruro de carbono como materia prima deben ser aprobados por el Gobierno. El examen incluirá registros de producción de CFC y DV ácido clorhídrico y las razones de producción;

c) Las importaciones de tetracloruro de carbono se verificarán por medio de la recopilación de los puertos de entrada, número de licencia de importación, país de origen, nombres de los importadores y cantidad de cada envío. Además, los registros de importación se verificarán en comparación con los registros de los impuestos sobre consumos específicos;

d) La exportación de tetracloruro de carbono se verificará por medio del examen de las licencias de exportación emitidas en comparación con la cantidad real exportada registrada en la Oficina de Aduanas.

Comentarios de la Secretaría

Verificación de la producción y el consumo de tetracloruro de carbono y el CFC-113 en 2003

27. La Secretaría desea felicitar al Banco Mundial y China por los esfuerzos realizados para desarrollar un sistema para supervisar la aplicación de los controles de la producción y el consumo de tetracloruro de carbono e implementarlo en el primer ejercicio de verificación realizado en China. El resumen de la verificación resulta especialmente útil, ya que proporciona una descripción general de toda la verificación e incluye tanto producción y consumo en comparación con los objetivos establecidos en el Acuerdo y el cumplimiento del Protocolo de Montreal. El Banco Mundial también llevó a cabo en 2003 una verificación de todos los productores de tetracloruro de carbono a fin de establecer la base para las verificaciones futuras. También proporcionó a la Secretaría el plan sectorial para la eliminación del tetracloruro de carbono in China, que está disponible a pedido.

Objetivos estipulados en el Acuerdo y logros

28. El Acuerdo especifica que el Banco Mundial proporcionará una verificación independiente de los límites de producción o consumo estipulados en las filas 1, 4 y 6 de la Tabla 2 del Acuerdo.

		Objetivo (Toneladas PAO)	Real* (Toneladas PAO)	Comentario
1.	Suma máxima admisible de producción e importaciones de CTC	61 514	61 854	Se superó el objetivo en 340 toneladas
4.	Consumo máximo admisible de CTC en las aplicaciones como agente de proceso indicadas en el Apéndice 2	5 049	2 545,45	Menor que el objetivo
6.	Consumo máximo admisible de CFC-113 en el sector de agentes de proceso	17,2	17,1	Menor que el objetivo

* Tomado de la Tabla 6 del resumen

29. El Banco Mundial sostiene que las 1 994,39 toneladas PAO de tetracloruro de carbono usadas como materia prima para la producción de sustancia químicas sin SAO (ácido cinámico y TFP) se deben deducir de la producción total de tetracloruro de carbono; como resultado, China habría cumplido con el objetivo de la fila 1.

30. Sin embargo, el objetivo de la fila 1 del Acuerdo se refiere a la producción total de tetracloruro de carbono en China para todos los usos, controlados y no controlados, y no se refiere la definición de producción del Protocolo de Montreal. Por lo tanto, el objetivo incluye el tetracloruro de carbono usado como materia prima. En relación con el tetracloruro de carbono usado como materia prima, la definición del Protocolo de Montreal no hace una distinción entre el uso del tetracloruro de carbono como materia prima para la producción de sustancias químicas que agotan la capa de ozono o no agotan la capa de ozono, ya que estipula que "Por 'producción' se entiende la cantidad de sustancias controladas producidas menos la cantidad de sustancias destruidas mediante técnicas que sean aprobadas por las Partes y menos la cantidad enteramente utilizada como materia prima en la fabricación de otras sustancias químicas".

31. Como resultado, las 1 994,39 toneladas PAO de tetracloruro de carbono usado como materia prima en la producción de sustancias químicas que no agotan la capa de ozono (ácido cinámico y TFP) se deben incluir en la suma de producción máxima admisible de producción e importaciones de tetracloruro de carbono, que es el objetivo de la fila 1 del Acuerdo. La Tabla 6 del resumen proporciona las tabulaciones correctas y se refiere al objetivo de la fila 1 del Acuerdo como la producción bruta.

Cumplimiento de los objetivos del Protocolo de Montreal

	Protocolo de Montreal (Toneladas PAO)	**Real* (Toneladas PAO)**	**Comentario**
Producción	29 367,40	20 020,30	Cumplimiento
Consumo	55 903,80	20 019,89	Cumplimiento

* Tomado de las Tablas 6 y 7 del resumen

32. El resumen proporciona en las Tablas 6 y 7 una presentación tabular de la producción y el consumo de tetracloruro de carbono conforme a las definiciones del Protocolo de Montreal, aplicando los resultados de la verificación. Según ambos puntajes, China se encuentra en situación de cumplimiento del consumo básico de referencia del Protocolo de Montreal para 2003. No obstante, no se verificaron las cantidades de importación y exportación de tetracloruro de carbono, si bien las cifras respectivas no son significativas (importaciones de tetracloruro de carbono: 0, exportaciones: 0,41 toneladas PAO).

33. La Secretaría pidió al Banco Mundial que aclarara si los auditores podían llegar alguna conclusión acerca del nivel de producción de tetracloruro de carbono sin contar con pleno acceso a los registros financieros del CTC-15 Shandong Jinling Group, tal como indicaron los auditores. Sin embargo, al momento de redactar el presente, la Secretaría no había recibido una respuesta del Banco Mundial.

Verificación del consumo

34. La verificación del consumo de tetracloruro de carbono y CFC-113 no resulta muy informativa, ya que no incluye ningún modelo de referencia para la verificación, tal como el cupo de importación emitido por el SEPA o la norma de la industria para el consumo de tetracloruro de carbono o CFC-113 en las diversas aplicaciones. Por lo tanto, resulta difícil

determinar, por ejemplo, si el nivel de tetracloruro de carbono que usa una empresa que produce caucho clorado es apropiado.

35. El Banco Mundial afirmó que el consumo de cada empresa de agentes de proceso se determina según el proceso químico y las condiciones de sus instalaciones; por ejemplo, si cuenta con un sistema de enfriamiento y de recuperación de tetracloruro de carbono, si se encuentra en buenas condiciones de funcionamiento, la gerencia de la empresa, etc. Dado que el consumo se encuentra muy por debajo de los límites y todas las compañías deberían cerrar o realizar una conversión en los próximos dos años, no pareció necesario recopilar información de sobre consumo básico más exhaustiva que la que ya se encontraba disponible con las encuestas realizadas durante la preparación del proyecto.

36. El consumo total de tetracloruro de carbono, tal como se indica en la Tabla 1 de la verificación del consumo es incorrecta, y la cantidad de 1 467 403 toneladas métricas debería corregirse a 2 800,4 toneladas métricas, como se indica en la Tabla 4 del resumen.

Marco de verificación

37. El enfoque propuesto por el marco de la verificación sigue las definiciones de producción y consumo del Protocolo de Montreal y proporciona a base adecuada para la verificación de la producción y consumo de tetracloruro de carbono en China.

38. La metodología propuesta en cada paso debería permitir al equipo de verificación recopilar datos apropiados y verificar los datos con referencias cruzadas de diferentes fuentes.

Recomendaciones

39. La Secretaría recomienda que el Comité Ejecutivo puede estimar oportuno:

a) Tomar nota, con beneplácito, del esfuerzo del Banco Mundial y el Gobierno de China para desarrollar el sistema de verificación para supervisar la ejecución de los planes sectoriales para eliminar la producción y el consumo controlados de tetracloruro de carbono en China, y aplicándolo por primera vez para la verificación de la producción y el consumo de tetracloruro de carbono en China en 2003;

b) Pedir al Banco Mundial y a China que incluyan en el futuro la verificación de las importaciones y exportaciones de tetracloruro de carbono y CFC-113, conforme al marco propuesto; y

c) Considerar la aprobación de la financiación del programa anual para 2004 por los valores propuestos de 16 millones $EUA y 1,2 millones $EUA en costos de apoyo, a la luz del hecho de que la producción de tetracloruro de carbono para 2003 de China superó el objetivo estipulado en el Acuerdo.

2003 SUMMARY VERIFICATION REPORT

FOR

THE PROCESS AGENT SECTOR PLAN: PHASE 1

WORLD BANK

WANSHINGTON, D.C., USA

MAY 2004

1. Introduction

As required by the agreement between China and the Executive Committee of the Multilateral Fund for Phase 1 of the Process Agent Sector Plan, China's annual production and consumption of CTC and consumption of CFC-113 must be verified independently by the World Bank. This report provides a summary of the verification of the 2003 production/consumption of these ozone depleting substances, including consumption in the 25 process agent applications covered by the agreement.

Consistent with the requirements, the World Bank appointed independent verification teams for the CTC production verification and for the verification of consumption of the process agent companies covered by the agreement. Each of the two teams consisted of two technical experts and one financial expert. The guidelines for CFC production verification were used as a template for the verification of CTC production, but adjusted to reflect the special features of different CTC production technologies. The consumption verification followed the general format for verifying consumption by ODS consuming companies. The CTC production verification and the CTC process agent consumption verification have been submitted separately.

2. Conclusion

The two teams were able to verify that overall production of CTC and consumption of CTC and CFC-113 were within the limits set by the agreement between China and the ExCom. Details appear in Table 1 below.

The verification of the CTC production sector also included uses of CTC as feedstock for non-ODS applications. A total of 1,994.39 ODP tonnes of CTC was confirmed as used for this purpose in China. Consistent with the provisions of the Montreal Protocol, the CTC production total was therefore reduced by 1,994.39 ODP tonnes. The use of CTC for feedstock for CFC production was included as part of the CFC production verification as reported to the 42nd meeting of the ExCom. The total use of CTC was confirmed as 39,839.31 tonnes ODP.

Table 1: CTC production and consumption in ODP tonnes

Year	CTC production* (Row 1 of the agreement)		Use of CTC for CFC feedstock consumption (Row 2 of the agreement		Use of CTC for the 25 PA applications (Row 4 of the agreement)		Use of CFC-113 for 25 PA applications (Row 5 of the agreement)	
	Allowed	Verified	Allowed	Verified	Actual	Verified	Actual	Verified
Base	86,280	N/A	N/A	N/A	3,825	N/A	17.2	N/A
2001	64,152	N/A	55,139	NA	4,347	N/A	17.2	N/A
2002	64,152	N/A	45,400	NA	5,049	N/A	17.2	N/A
2003	61,514	**59,860**	45,333	**39,839**	5,049	**3,080**	17.2	**17.1**
2004	54,857		39,306		5,049		14	
2005	38,686		28,446		493		14	
2006	32,044		21,276		493		10.8	
2007	26,457		15,129		493		8.4	
2008	23,583		11,662		493		0	
2009	17,592		5,042		493		0	
2010	11,990		0		220		0	

3. CTC plant production verification

The verification team audited each of the 10 CTC producers presently producing CTC in China and the two CTC distillers. CTC production in 2003 was confirmed as 59,859.57 ODP tonnes. The detailed production and raw material figures are reported in the annexes to the CTC production verification report.

Table 2: Summary of quotas issued by SEPA and actual verified CTC production in 2003

Name of producer		CTC production quota (in MT)	CTC production in 2003 (in MT)	Comments
CTC-1	Luzhou North Chemical Co. Ltd.	2,106	2,105.22	
CTC-2	Juhua Fluoro-chemical	16,204	16,203.74	
CTC-3		0	0	Plant closed
CTC-4	Chonqing Tianxuan	875	869.85	Plant shut-down 12/26/03
				Distiller, see below
CTC-6	Chongqing Tianyuan	6119	6114.24	
CTC-7		0	0	Plant closed
CTC-8	Luzhou Xinfu	5,208	5,203.28	
CTC-9	Jiangsu Meilan	3,423	3.395.89	
CTC-10		0	0	Plant closed
CTC-11	Sichuan Honghe	13,768	13,763.37	
CTC-12	Shanghai Chlor-Alkali	7,209	7,209	
CTC-13				Distiller, see below
CTC-14	Wuxi Greenapple	500	495.15	New producer started operation in 2003
CTC-15	Shangdong Jinling	150	147.74	New producer started operation in 2003
CTC-5	Chongqing Tiangsheng	134	129.80	CTC Residue
CTC-13	Quzhou Jiuzhou	596	593.59	CTC Residue
Production plus recovery of CTC from residues		**56,292 MT**	**56,230.87 MT**	
CTC used for non-ODS feedstock applications		**NA**	**-1,813.08**	
2003 CTC production		**NA**	**54,417.79**	59,859.57 ODP tonnes

4. CTC used by CFC producers

The CTC used by the CFC producers was verified as part of the CFC verification. The report was submitted to the 42nd meeting of the ExCom for consideration.

Table 3: CTC consumption by CFC producers

	CFC-11 and CFC-12 production (ODP tonnes)	CTC consumption (ODP tonnes)	CTC consumption (MT)
Jiangsu Meilan Chemical Co., Ltd.	2,063.17	2,961.88	2,692.62 MT
Zhejiang Juhua Fluorochemical Co., Ltd.	11,353.52	16,797.42	15,270.38 MT
Zhejiang Dongyang Chemical Plant	1,442.22	2,214.18	2,012.89 MT
Jiangsu Changsu* 3F Refrigerant Co. LTD	14,918.50	17,865.83	16,241.66 MT
Total		39,839.31	36,217.55

5. Companies using CTC for non-ODS production

China has a number of non-ODS feedstock users. In order to allow monitoring of the total production as defined by the MP, the companies and users of CTC for non-ODS feedstock applications have been included in the overall CTC verification. The total consumption of CTC identified is 1,994.39 ODP tonnes. The Bank's verification team visited two CTC feedstock users, Lanxi Agrochemical Co. Ltd and Zhejiang Sanhuan Chemical Co., Ltd.

More feedstock applications and companies might be identified and confirmed through the work presently undertaken by SEPA for the implementation of Phase 1 of the Process Agent Sector Plan and the preparation of the sector plan for Phase 2. As the list of companies and their production is commercially sensitive, the list is not included here but is available to the Secretariat for internal review if so requested.

6. CTC used as process agent for the applications covered by Phase 1

A total of 27 production lines at 25 companies were verified. The verification included CTC procurement records and was checked against the quantities of the products produced by the companies and the historical ratio from the PA sector plan on CTC consumption per tonnes of the product produced.

Table 4: Companies using CTC as process agent

Enterprises using CTC as process agent	**Purchase of CTC (MT)**	**Consumption of CTC (MT)**
Shanghai Dihe Chemical Plant	223.18	205.24
Haotian Chemical Co., Ltd. (CR2)	199.5	167.59
Wuxi Greenapple Chem Co Ltd (CR3)	128.14	132.89
Zheijiang Xin'an Chemical and Industrial Co., Ltd. (CR4)	220.5	220.577
Jiangyin Fasten Fine Chemical Co. Ltd. (CR5)	212.64	193.38
He-nan Puyang Oilfield CR Factory (CR6)		See next row
Sinopec Zhongyuan Chlorinated Rubber	0	0
Shangyu Qiming Chemical Co. Ltd. (CR7)	0	0
Hebei Huanghua Jihua Chemical Co. Ltd. (CP1)	90	105.5
Zheijiang Xin'an Chemical and Industrial Co., Ltd. (CP2)		See CR4 above)
Jiangyin Fasten Fine Chemical Co. Ltd. (CP3)		See CR5 above
Shenyang Chemical Co. Ltd. (CP4)	44	59.62
Longchang Shouchang Chemical Co. Ltd. (CP5)	141	146
Longchang Shenghua Chemical Factory (CP6)	98.2	102.2
Chongqing Tianyuan Chemical general factory(CP7)		0 See note
Longyou Greenland Pesticides Co. Ltd.(CP8)	0	0
Dalian Jiangxi Chem-Industrial Co. Ltd. (CP9)	260.04	340.66
Harbin Yibin Chemical Co., Ltd.(CP10)	61.3	61.81
Jilin Chemical Industrial Co. Ltd. (CSR1).	1,338.27	1,016.857
Jiangsu Anbang Group Corporation (ES1)	165.14	37.4
Huahai Pharmaceutical Co., Ltd. (KET1)	6.0	10.676
Total CTC Consumption	3187.91	**2,800.40**

Table 5. Companies using CFC-113 as process agent

Enterprises using CFC-113 as process agent	Purchase of CFC-113 for PA use (MT)	Consumption of CFC-113 as PA (MT)
Shanghai 3F New Material Co. Ltd. (Plant No. 2)(PTFE1a)	5.5	5.5
Shanghai 3F New Material Co. Ltd. (Fluoro Plant)(PTFE1b)	4.5	4.5
Chenguang Chemical Research Institute (PTFE2)	3.5	3.39
Jinan 3F Fluoro-Chemical Co. Ltd. (PTFE3)	5	5
Jiangsu Meilan Chemical Co. Ltd.(PTFE4)	0	0
Fuxin Fluoro-Chemical Co. Ltd. (PTFE5)	3.0	3.0
Total CFC-113 Consumption (in MT)	**21.5**	**21.39**
Total CFC-113 consumption in ODP tonnes		**17.11**

7. CTC import and export

China did not import any CTC in 2003. Quotas for export of 0.375 MT CTC were issued by the ODS import/export office.

8. National production and consumption

Based on the verification carried out and information provided by SEPA, national consumption and production of CTC is shown in the table below.

Table 6: National CTC production

CTC Production	(ODP tonnes)
Gross production	61,854
Used as feedstock for ODS production	39,839.31
Used as feedstock for non-ODS production	1,994,39
Destroyed by technologies approved by the Parties	0
National CTC production as per the Montreal Protocol	20,020.3

Table 7: National CTC consumption

CTC Consumption	(ODP tonnes)
Production as per the Montreal Protocol	20,020.3
Import of CTC	0
Export of CTC	0.41
National CTC consumption as per the Montreal Protocol	20,019.89

CHINA PROCESS AGENT SECTOR PLAN

PHASE I

2003 CTC Production Verification Report

The World Bank

May 2004

1. Introduction.

As requested by the agreement between China and the Executive Committee of the Multilateral Fund for the Process Agent Sector Plan, Phase 1, the annual production and consumption of CTC and consumption of CFC-113 must be verified independently by the World Bank. This report provides an update of the 2003 verification work covering the production of CTC. The final verification report, including the CTC and CFC-113 production and consumption will be submitted to the 43rd meeting of the ExCom, July 2004.

Consistent with the requirements, the World Bank appointed an independent verification team for the CTC production verification. The verification team consisted of two technical experts and one financial analyst to conduct the verification. One of the technical experts is a senior US technical expert; the other two, one technical expert and the financial analyst, both fluent in Chinese speaking and familiar with Chinese production technology and accounting practice. The guidelines for CFC production verification were used as template for the verification of the CTC production. However, the CTC production reporting format was adjusted to reflect the special features of the 5 different CTC production technologies used in China. For further details, see the World Bank report "CTC verification format", February 2004.

2. Conclusion.

The CTC verification team was able to verify that the overall production of CTC was, within the limits set by the agreement between The People Republic of China and the Executive Committee of the Multilateral Fund.

The verification of the CTC production sector also included uses of CTC as feedstock for non-ODS applications. A total of 1,713.08 MT CTC are used for non-ODS feedstock applications in China. The WB visited two of the plants with a total CTC consumption of 595.67. Consistent with the provisions of the Montreal Protocol and the Article 7 data reporting format, China has not reported such uses in its reporting to the Ozone Secretariat. Accordingly, the CTC production was reduced by 1,884.39 tonnes ODP of CTC (1,713.08 MT) used as feedstock for non-ODS feedstock applications.

3. Verification of CTC production

The verification team verified the production at each of the 10 CTC producers presently producing CTC in China and the two CTC distillers. It was confirmed by the verification that the 2003 CTC production of 59,859.57 ODP tonnes of CTC was below the allowed CTC production as per the agreement with ExCom. The detailed production and raw

material figures are reported in the annexes to this summary report. The verification team also confirmed that each producer had produced within the production quotas given by SEPA.

Table1: Summary of quotas issued by SEPA and actual verified CTC production in 2003 (in MT ODS)**.**

Name of producer		CTC production quota (in MT)	CTC production in 2003 (in MT)	Comments
CTC 1	Luzhou North Chemical Co. , Ltd.	2,106	2,105.22	
CTC 2	Zhejiang Juhua Fluoro-chemical Co., Ltd.	16,204	16,203.74	
CTC 3	Lioning Panjing No. 3 Chemical Plant	0	0	Plant closed.
CTC 4	Chonqing Tianxuan Chemical Co., Ltd.	875	869.85	Shut-down 12/26/03
CTC 6	Chongqing Tianyuan Chemical General Plant	6119	6114.24	
CTC 7	Taiyuan Chemical Industrial Co., Ltd.	0	0	Plant closed
CTC 8	Luzhou Xinfu Chemical Industry Co., Ltd.	5,208	5,203.28	
CTC 9	Jiangsu Meilan Chemical Co., Ltd.	3,423	3.395.89	
CTC 10	Guangzhou Hoton Chemical (Group) Co., Ltd.	0	0	Plant closed
CTC 11	Sichuan Honghe Fine Chemical Co., Ltd.	13,768	13,763.37	
CTC 12	Shanghai Chlor-Alkali	7,209	7,209.00	
CTC 14	Wuxi Greenapple	500	495.15	New producer started operation in 2003
CTC 15	Shangdong Jinling	150	147.74	New producer started operation in 2003
	CTC Producers (MT)	55,562	55,507.48	
CTC 5	Chongqing Tiangsheng	134	129.80 MT	CTC Residue
CTC 13	Quzhou Jiuzhou	596	593.59 MT	CTC Residue
CTC through distillation of residues by the two plants		730	723.39 MT	
Production plus recovery of CTC from residues		**56,292**	**56,230.87 MT**	
CTC used for non ODS feedstock applications See table 2		**NA**	**- 1,813.08 MT**	
2003 CTC production		**NA**	**54,417.79 MT**	**59,859.57ODP tonnes**

3. Companies using CTC for non-ODS production.

China has a number of non-ODS CTC feedstock users. In order to allow monitoring of the total CTC production as defined by the MP, the companies and uses of CTC for non-

ODS feedstock applications has been included in the overall CTC verification. The total consumption is 1803.08 MT. Two feedstock users, Lanxi Agrochemical Co., Ltd and Zhejiang Sanhuan Chemical Co., Ltd. Was visited by the verification team More feedstock applications might be identified and confirmed through the work presently undertaken by SEPA for the implementation of PA I and preparation of the sector plan for PA II. As the list of companies are their specific products are commercial sensitive, the list of companies and there confirmed CTC consumption can be provided to the Secretariat if so requested.

CHINA CTC PRODUCTION PHASE-OUT PROGRAM
2003 VERIFICATION REPORT
April 29, 2004

CTC Verification Team

- E. John Wilkinson, Team Leader
- Zhiqun Zhang, Technical Consultant
- Jianrong Yin, Financial Consultant

Assisted and Accompanying by

- Wang, Xiaocheng, China State Environmental Protection Administration (SEPA), attended 2/04/04 - 2/13/04
- Feng, Liulei, SEPA, attended 2/13/04 – 2/20/04

Verification Mission Time Frame

The mission began on February 02, 2004 in Hangzhou and ended in Shandong on February 20, 2004. In total 14 enterprises were visited and verified.

Number	Enterprise	Process	Date
CTC 01	Luzhou North Chemical Industrial Co., Ltd.	Methanol- Based	Feb. 16, 2004
CTC 02	Zhejiang Juhua Fluorochemical Co., Ltd.	Methanol- Based	Feb. 04, 2004
CTC 03	Liaoning Panjin No.3 Chemical Plant	Closed in 2001	Not visited
CTC 04	Chongqing Tianxuan Chemical Co., Ltd.	Methane-Based	Feb. 14, 2004
CTC 05	Chongqing Tiansheng Chemical Co., Ltd.	Residue Distillation	Feb. 13, 2004
CTC 06	Chongqing Tianyuan Chemical General Plant	Methane-Based	Feb. 13, 2004
CTC 07	Taiyuan Chemical Industrial Co., Ltd	Closed in 1998	Not visited
CTC 08	Luzhou Xinfu Chemical Industry Co., Ltd.	Methane-Based	Feb. 15, 2004
CTC 09	Jiangsu Meilan Chemical Co., Ltd.	Methanol- Based	Feb. 11, 2004
CTC 10	Guangzhou Hoton Chemical (Group) Co., Ltd.	Closed in 1997	Not visited

CTC 11	Sichuan Honghe Fine Chemical Co., Ltd.	Methane-Based	Feb. 17, 2004
CTC 12	Shanghai Chlor-Alkali Chemical Co, Ltd.	Ethylene-Based	Feb. 09, 2004
CTC 13	Quzhou Jiuzhou Chemical Co., Ltd.	Residue Distillation	Feb. 05, 2004
CTC 14	Wuxi Greenapple Chemical Co., Ltd.	Methanol- Based	Feb. 10, 2004
CTC 15	Shandong Jinling Group Company	Methanol- Based	Feb. 19, 2004
CTC F1	Juhua Lanxi Agrochemical Co., Ltd.	CTC Feedstock	Feb. 06, 2004
CTC F2	Zhejiang Sanhuan Chemical Co. Ltd.	CTC Feedstock	Feb. 07, 2004

VERIFICATION METHODOLOGY FOR EACH PLANT VISITED

The Verification Team attempted to gather the following information from each plant in order to verify their 2003 CTC production:

- plant identification (name, technical audit number, address, contact person and function title, telephone and fax numbers, and email address);
- plant history (date of construction, number of CTC production lines, capacity in baseline year 2000, and baseline production for 2001 and 2002);
- plant process clarification and where within the plant process would it be best to collect CTC production data for our verification;
- CTC production quotas received from SEPA for 2003;
- daily CTC production logs and CTC product transfer records;
- daily and monthly CTC storage inventory; and
- CTC packaged for sales verified from daily movement records of CTC out of the product warehouse.

Secondary information was also gathered in order to support the CTC production data:

- chlorine (Cl_2) consumption from daily shift transfer records and opening and closing stocks from monthly production inventory;
- organic raw material methane (CH_4), methanol (CH_3OH) and ethylene (C_2H_4) supply from transfer records;
- organics consumption from opening and closing stocks inventory and daily shift transfer records;
- CTC's co-product's [methyl chloride (CM1), methylene chloride (CM2), chloroform (CM3), and perchloroethylene (PCE)] production in metric tones;
- CTC output ratios and raw material consumption ratios were calculated for CTC/ CMs, CTC/ (PCE+CTC), Cl_2/CTC, CH_4/CTC, CH_3OH/CTC, and C_2H_4/CTC. The Enterprise's annual average ratio was compared with the theoretical value in order to determine whether or not the values varied within a reasonable range and generally slightly above the theoretical value.

Concurrently, a financial verification was determined by reviewing and checking:

- the accounting system's reliability;
- the reports related to raw material purchase, storage and transfer;
- the accounting records of CTC production, transfer and sales;
- the track number from the accounting records traced back to the original documents; and
- any inconsistencies were asked to be clarified.

Once all of the above was completed, the CTC Verification Team would determine whether or not the Enterprise's 2003 CTC production data were verified.

SUMMARY OF DATA COLLECTION AND VERIFICATION RESULTS FOR EACH ENTERPRISE

CTC 01: Luzhou North Chemical Industrial Co., Ltd.

The company is a chloromethanes (CMs) producer that uses methanol (CH_3OH) and chlorine (Cl_2) as raw materials to produce CTC and chloroform (CM3). Its 2003 CTC production quota is **2,106.00 MT** and verified production is **2,105.22 MT**.

1.1 CTC production, stocks and sales

This plant defines CTC production as the amount of produced CTC transferred from the unfinished product storage tank to the CTC finished product tank. However, the recorded CTC production data were not measured by metering or weighing physically, but determined by making following mass balance on the CTC finished product tank:

CTC production = CTC sales + (ending stock – beginning stock)

CTC sales data are taken from the plant CTC daily transfer records. CTC is weighed and packaged in tank trucks and some drums as that amount of CTC transferred from CTC finished product storage tank for sale.

CTC beginning and ending stocks are taken from the CTC product storage inventory. The plant takes readings on the 23rd day of each month between 8:30 AM and 9:00 AM.

CTC production for both January and February were taken together in this plant because of the Chinese New Year.

1.2 Chlorine (Cl_2) supply and consumption

Gaseous chlorine (Cl_2) is supplied by Chlor-Alkali Factory of the company and directly fed into chlorination reactors through pipeline without use of a storage tank. Therefore, there is no Cl_2 stock inventory recorded in the CMs plant; Cl_2 consumption = Cl_2 supply.

Cl_2 supply for CMs production is determined by the supplier's Cl_2 allocation balance, based on the following equation:

> Cl_2 supply for CMs production = Total Cl_2 generated from chlor-alkali – liquid Cl_2 for sales – liquid Cl_2 for water disinfection and hospital sterilization – (liquid Cl_2 storage ending stock – liquid Cl_2 storage beginning stocks)

The plant took its data records for both January and February together because of the Chinese New Year.

1.3 Methanol (CH_3OH) supply and consumption

Methanol is supplied from outside and delivered into a feedstock storage tank first, and then added into the CMs reactors.

Methanol consumption is determined by the plant's monthly CH_3OH supply records and CH_3OH storage stock inventories:

CH_3OH consumption = CH_3OH supply – (ending stocks – beginning stocks)

CH_3OH supply is measured by daily transfer records of CH_3OH from outside to the raw material storage tank. CH_3OH stock inventory is taken on the 23rd day of each month between 8:30 AM to 9:00 AM. For January and February, CH_3OH data were recorded together by the plant due to the Chinese New Year.

1.4 Verification results

Table 1.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**2,105.22**	3,163.78	0.00	0.00

Table 1.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	0.00	7,681.87	7,681.87	0.00
Methanol, MT	11.94	1,517.54	1,485.58	43.90

Table 1.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC produced	CTC sales	Ending stock
CTC, MT	14.76	**2,105.22**	2,047.43	72.55

Table 1.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	CH_3OH/CTC, MT/MT
Theoretical	1.38	0.21
Actual	1.59	0.24

The 2003 total operating days are 297.23. The annual average production of CTC per operating day is 7.08 MT/day.

For further details, please see ANNEX I-Table 1.

CTC 02: Zhejiang Juhua Fluorochemical Co., Ltd.

The company is a chloromethanes (CMs) producer applying chlorine (Cl_2) and methanol (CH_3OH) as raw materials to produce carbon tetrachloride (CTC), chloroform (CM3), methylene chloride (CM2) and methyl chloride (CM1). Their CTC production quota for 2003 is **16,204.00 MT** and the verified 2003 production is **16,203.74 MT**.

Most of the CTC produced in the company is sent to CFC plant of company for CFC 11 and CFC 12 production. The total amount of the produced CTC transferred to the CFC plant for internal CFC uses is 15,241.41 MT, consistent with the CFC verification.

2.1 CTC production, stocks and sales

The plant has two CTC storage tanks. Produced CTC is sent to the unfinished product storage (workshop storage tank) first, and then transferred to the CTC finished product storage after analysis. Disqualified CTC is returned to the system for reprocessing.

CTC production is defined as that amount of qualified CTC transferred from the unfinished product storage tank to the finished product storage tank.

CTC sales are measured by CTC daily packaging and transfer records from the CTC finished product storage tank to the outside for sales. The amount of CTC packaged but not sold is stored in the CTC warehouse and still included in the CTC stock inventory.

CTC stock inventories are taken by the plant at 8:00 AM on the second to last day of each month. However, for January, the last day of the operation month is defined as the 21st day of the month because of the Chinese New Year.

The CTC production, sales and stocks obey the following equation:

CTC production – CTC sales – CTC sent for CFC 11/12 production
= CTC ending stock – CTC beginning stock

CTC transferred from the finished product storage to CFC plant for producing CFC 11/12 is measured by the plant's CTC daily transfer records.

2.2 Chlorine (Cl_2) supply and consumption

Liquid Cl_2 is supplied by Electrochemical Factory of Juhua Chemical Group Company. The supplied Cl_2 is sent to a chlorine feedstock purification tower to remove impurities first, and then added to the CMs reactors by pipeline without the use of a storage tank. Entrained Cl_2 in the purification tower is recycled back to the supplier, and therefore,

Cl_2 added to CMs reactors = Cl_2 supply – Cl_2 recycled back to the supplier

The Cl_2 stocks defined in the plant are the amount of Cl_2 back calculated from the unfinished CTC and CMs products that remain in the production process. Readings are taken at 8:00 AM on the second to last day of each month.

Then, the Cl_2 consumption for CMs production is determined by:

Cl_2 consumption = Cl_2 added to CMs reactors + (beginning stock – ending stock)

2.3 Methanol (CH_3OH) supply and consumption

There are two CH_3OH storage tanks in the plant. Methanol is purchased from outside and sent to the CH_3OH storage first, and then added into two CMs reactors.

CH_3OH procured is verified from the plant daily movement records of CH_3OH transferred from outside to the raw material storage tanks.

CH_3OH stocks are taken from the storage inventory (storage #1 + storage #2 + CH_3OH amount back calculated from the unfinished CTC and CMs products that remain in the process).

CH_3OH consumption is calculated by:

CH_3OH consumption = CH_3OH procured + (beginning stock – ending stock)

2.4 Verification results

Table 2.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**16,203.74**	45,440.44	32,583.69	212.93

Table 2.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Other uses	Ending stock
Chlorine, MT	1,555.93	105,609.17	106,514.28	148.40*	502.42
Methanol, MT	501.05	30,868.43	31,136.60	0.00	232.87

* Entrained Cl_2 in the chlorine purification tower and recycled back to the supplier.

Table 2.4.3 CTC production, stocks, and sales

Product	Beginning stock	CTC produced	Internal CFC uses	CTC sales	Ending stock
CTC, MT	1,538.00	**16,203.74**	15,241.41*	2,329.41	170.92

* Sent to CFC plant for CFC 11 and CFC 12 production.

Table 2.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	CH_3OH/CTC, MT/MT
Theoretical	1.38	0.21
Actual	1.42	0.23

The number of 2003 operating days is 348.90 and the annual average CTC production per operating day is 46.44 MT/day.

For further details, please see ANNEX I-Table 2.

CTC 03: Liaoning Paning No. 3 Chemical Plant

This plant is a former CTC producer which was closed in 2001 and not visited during the mission.

CTC 04: Chongqing Tianxuan Chemical Co., Ltd.

The company is a dedicated CTC producer that uses chlorine (Cl_2) and natural gas (97% CH_4) as raw materials to produce CTC with a small amount of chloroform (CM3) as a co-product. Its 2003 CTC production quota is **875.00 MT** and the verified production is **869.85 MT**.

4.1 CTC production, stocks and sales

The plant had three CTC storage tanks, an unfinished CTC tank (before analysis), a finished CTC product tank, and a CTC sales storage located in railway station.

CTC production defined in the plant is the amount of qualified CTC transferred from the unfinished CTC tank to the finished product storage tank, which is calculated by the following equation:

CTC production = CTC sales + (ending stock – beginning stock) + other uses.

CTC sales are measured by daily transfer records from the railway CTC storage to outside for sale; all CTC is packaged in drums.

CTC ending and beginning stocks are taken from the plant CTC storage inventory (plant storage + railway station storage + CTC in process). The plant takes readings on the last day of each month between 8:00 AM and 12:00 PM.

4.2 Chlorine (Cl_2) supply and consumption

Chlorine is supplied by its parent company, Chongqing Changshou Chemical Co., Ltd. and fed into three CMs reactors in gas form by pipeline directly without the use of a raw material storage tank. Therefore, in this plant, the Cl_2 supply = the Cl_2 consumption.

4.3 Natural gas (97% CH_4) supply and consumption

Similar to Cl_2, natural gas is also supplied by its parent company and directly added into the CMs reactors by pipeline without the use of a storage tank. Therefore, natural gas supply = natural gas consumption.

4.4 Verification results

Table 4.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**869.85**	108.36	0.00	0.00

Table 4.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	0.00	2,760.89	2,760.89	0.00
Natural gas (97% CH_4), Nm^3	0.00	305,583.00	305,583.00	0.00

Table 4.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC produced	CTC sales	Other uses	Ending stock
CTC, MT	582.58	**869.85**	1,451.66	0.34*	0.43

* Internal loss in the CTC storage and CTC transportation due to leaking, see ANNEX I-Table 4.

Table 4.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	Natural gas (97% CH_4)/CTC, Nm^3/MT
Theoretical	1.85	149.73
Actual	2.83	302.72

The 2003 total operating days are 143.52 and the annual average CTC production per operating day is 6.06 MT/day.

It is noted that, when the CTC Verification Team visited the plant site on February 14, 2004, the plant was not in production and the Team was informed that all equipment of

the CTC production lines (reactors, distillation columns, etc.) had been completely dismantled on January 9, 2004. The Enterprise provided a CD and photos documenting the event. SEPA and local EPA officers inspected the dismantling process.

For further details, please see ANNEX I-Table 4.

CTC 05: Chongqing Tiansheng Chemical Co., Ltd.

This company is a CTC residue distillation plant that treats CTC residue (procured from other CTC producers) by distillation and sells CTC as a final product. Its 2003 CTC production quota is **134.00 MT** and the actual CTC production is verified as **129.80 MT**.

5.1 CTC production, stocks and sales

The company is a CTC residue distillation plant that purchases CTC residue from other CTC producers (Changing Tianyuan, Luzhou Xinfu, Chongqing Tianxuan, etc.) as raw material for further processing by distillation to recover thereinto CTC as product.

CTC production defined in the plant is the amount of CTC produced from the distillation column and transferred to the CTC product storage tank.

CTC sales are defined as the amount of CTC packaged and moved out of the product storage tank for sales. All CTC is packaged in tank trucks and in some drums.

CTC stock inventory is zero because all produced CTC is sold out by end of each month.

5.2 CTC residue supply and consumption

CTC residues purchased from other CTC producers are delivered to the plant's raw material storage tank, and then fed into the plant distillation tower for batch processing.

Raw material supply and consumption are defined as the amount of CTC residue delivered from outside to the raw material storage tank and the amount of CTC residue transferred from the storage tank to the distillation tower.

CTC residue stock inventories are taken at the end of each month.

5.3 Verification results

Table 5.3.1 Raw material consumption

Raw material	Beginning stock	Procured or added to stock	Consumption	Ending stock
CTC residue, MT	0.00	513.33	513.33	0.00

Table 5.3.2 CTC production, stocks and sales

Product	Beginning stock	CTC produced	CTC sales	Ending stock
CTC, MT	0.00	**129.80**	129.80*	0.00*

* Financial verification indicated that the plant sold out 115.94 MT CTC in 2003 and held 13.86 MT of CTC as closing stock by end of the year. The plant explained that the difference was caused by errors in writing while recording the financial documents.

Table 5.3.3 Raw material consumption ratio

Ratios	CTC residue (raw material)/CTC product, MT/MT
Theoretical	N/A
Actual	3.95

The 2003 total operating days are 260 and the annual average production of CTC per operating day was 0.50 MT/day.

For further details, please see ANNEX I-Table 5.

CTC 06: Chongqing Tianyuan Chemical General Plant

The company is a dedicated CTC producer that uses chlorine (Cl_2) and natural gas (97% CH_4) as feedstocks to produce CTC with a small amount of chloroform (CM3) as a co-product. The plant has five CMs reactors with a CTC production quota for 2003 of **6,119.00 MT** and its 2003 verified production is **6,114.24 MT**.

6.1 CTC production, stocks and sales

This plant has four CTC unfinished product storage tanks and ten CTC finished product tanks. CTC produced from the process is sent to an unfinished product tank for analyzing the product quality first, and then, if qualified, transferred to the finished product storage tanks for packaging (drums or tank trucks) sales.

The CTC production defined in the plant is the amount of qualified CTC transferred from the unfinished product tank to the finished product tank. However, no flowmeter installed between the storages to measure the CTC product output. The plant's CTC production records are derived from the following equation:

CTC production = CTC sales + (ending stock – beginning stock) + CTC other uses.

CTC sales are verified from daily transfer records of CTC moving from the CTC finished product tank to outside for sale - all packaged by tank truck and some drums.

CTC stock inventory is taken between 8:00 AM to 8:30 AM at the last day of each month.

6.2 Chlorine (Cl_2) supply and consumption

Chlorine is supplied by Chlor-Alkali Factory of the company, which is fed to five CTC reactors directly by pipeline without the use of a storage tank. No gauge is applied in the plant to measure Cl_2 flow rates from outside to the reactors.

The amount of Cl_2 supplied to CMs production is determined by the supplier based on their total NaOH output, ratio of total Cl_2 generated from the chlor-alkali process (0.855 MT Cl_2 per MT NaOH), and the following allocation formula:

$$\text{NaOH output} \times 0.855 = \Sigma\,(P_i \times R_i \times AF_i)$$

Where i = the Cl_2-related product in the company including liquid Cl_2, hydrochloric acid, and chloromethanes, etc.; P = the output of Cl_2 related product, MT; R = Cl_2 consumption ratio of the product, MT Cl_2/MT product; AF = the Cl_2 allocation factor depending on the specific product, dimensionless.

Cl_2 beginning and ending stocks are defined as the amount of Cl_2 back calculated from the process, including unconsumed raw material and unfinished CTC and CM3 products that remain in the process.

Then, Cl_2 consumption is determined by the plant as:

$$Cl_2 \text{ consumption} = Cl_2 \text{ supply} + (Cl_2 \text{ beginning stock} - Cl_2 \text{ ending stock})$$

6.3 Natural gas (97% CH_4) supply and consumption

Natural gas is supplied by Chongqing Natural Gas Supply Company and, transferred by pipeline, directly added into the reactors without use of a storage tank. Therefore, in the CMs plant, natural gas supply = natural gas consumption.

Natural gas beginning and ending stocks are also back calculated by the plant from the process. CH_4 consumption is determined by:

$$CH_4 \text{ consumption} = CH_4 \text{ supply} + (CH_4 \text{ beginning stock} - CH_4 \text{ ending stock})$$

6.4 Verification results

Table 6.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**6,114.24**	520.75	0.00	0.00

Table 6.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	270.24	15,482.88	15,668.31	84.81
Natural gas (97% CH_4),, Nm^3	30,669	1,722,274	1,743,272	9,671

Table 6.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC Produced	CTC sales	Other uses	Ending stock
CTC, MT	1,263.56	**6,114.24**	6,742.73	0.05*	635.01

* Internal used in the plant for paint cleaning

Table 6.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	Natural gas (97% CH_4)/CTC, Nm^3/MT
Theoretical	1.85	149.73
Actual	2.37	256.92

The 2003 total operating days are 264.6 and the annual average CTC production per operating day is 23.11 MT/day.

For further details, please see ANNEX I-Table 6.

CTC 07: Taiyuan Chemical Industrial Co., Ltd.

This plant is a former CTC producer which was closed in 1998 and not visited during the mission.

CTC 08: Luzhou Xinfu Chemical Industry Co., Ltd.

The company is a dedicated CTC producer using chlorine (Cl_2) and natural gas (97% CH_4) to produce CTC, with a small amount of chloroform (CM3) as co-product. In 2003, its CTC production quota is **5,208.00 MT** and the verified CTC production is **5,203.28 MT**.

8.1 CTC production, stocks and sales

The plant has one CTC product storage tank and one CTC warehouse (after packaging) for sales.

CTC production is defined as the amount of qualified CTC transferred from the manufacturing process to the CTC product storage, and determined by the following equation based on measurement of CTC sales and CTC stocks:

CTC production = CTC sales + (ending stocks - beginning stocks)

CTC sales are recorded by weighing while the product is packaged and transferred from the product storage to the warehouse for sale, all in tank truck and some drums (250 kg).

CTC stock inventories are taken from both CTC product storage and CTC warehouse at 4:00 PM on the 25th day of each month.

8.2 Chlorine(Cl_2) supply and consumption

Gaseous chlorine is supplied by the company's electrochemical production unit. Total amount of Cl_2 generated from the production process is allocated by a distribution device and sent to different applications for producing liquid Cl_2, hydrochloric acid, $FeCl_3$, and chloromethanes, etc.

No gauge is applied in the plant to measure the allocated amount of Cl_2 sent for CMs production, but determined by the following equation:

Cl_2 supply to CMs production = Total Cl_2 generated – Internal uses for liquid Cl_2, HCl, and $FeCl_3$ production

Supplied Cl_2 is fed into CTC reactors by pipeline directly from the electrochemical production unit without the use of a storage tank. So that, in the CMs production, Cl_2 supply = Cl_2 consumption.

8.3 Natural gas (97% CH_4) supply and consumption

Natural gas is supplied by China Petroleum Southwest Natural Gas Field Company. The total amount of natural gas transferred from outside is also allocated for different applications in the plant, including CMs production, NaOH production, and general heating purposes.

Natural gas allocated for CMs production is determined by the following balance:

CH_4 sent to CMs = total CH_4 supply – internal uses in the plant for NaOH production and general heating purposes

The natural gas is fed into CTC reactors directly by pipeline without use of a feedstock storage tank. Therefore, in this plant, there is no natural gas stock inventory records for CMs production; natural gas supply = natural gas consumption.

8.4 Verification results

Table 8.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene	Methyl

			Chloride	Chloride
Production, MT	**5,203.28**	401.00	0.00	0.00

Table 8.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Total supply	Consumed for CMs	Other uses	Ending stock
Chlorine, MT	0.00	19,245.88	15,773.72	3,472.16*	0.00
Natural gas (97% CH_4), Nm^3	0.00	4,182,041	1,866,861	2,315,180 **	0.00

* Internal uses in the plant for liquid Cl_2, HCl and $FeCl_3$ production.

** Internal uses in the plant for caustic soda production and general heating usage.

Table 8.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC Produced	CTC sales	Ending stock
CTC, MT	143.53	**5,203.28**	4,845.15	501.66

Table 8.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	Natural gas (97% CH_4)/CTC, Nm^3/MT
Theoretical	1.85	149.73
Actual	2.82	326.39

The number of operating days for 2003 is 196.60 and the annual average production of CTC per operating day is 26.47 MT/day.

For further details, please see ANNEX I-Table 8.

CTC 09: Jiangsu Meilan Chemical Co., Ltd.

The company is a chloromethanes producer that uses methanol (CH_3OH) and chlorine (Cl_2) as feedstock to produce CTC, chloroform (CM3) and methylene chloride (CM2). Its 2003 CTC production quota is **3,423.00 MT** and verified production is **3,395.89 MT**.

Also the company consumes CTC as feedstock for producing CFC11 and CFC12. In 2003, total amount of the produced CTC that was transferred to CFC plant for CFC11 and CFC12 production is 1,043.13 MT, which is consistent with the finding of the CFC verification. Also, the company purchased in excess of 1,653.54 MT CTC for CFC production that was included in the CFC verification.

9.1 CTC production, stocks and sales

CTC produced from the process is sent to an unfinished product storage tank first, and then transferred into a finished product storage tank after analyzing its composition. Disqualified CTC is returned to the system for reprocessing.

CTC production is defined as the amount of qualified CTC transferred from the unfinished product storage to the finished product tank.

CTC sales are measured by the plant daily package and transfer records from the CTC finished product storage to outside.

Daily production logs in the plant record the amount of CTC transferred as a feedstock from the CTC finished product storage tank to the CFC 11/12 plant. Then, CTC ending stock was calculated by the plant in each month as the following equation:

Ending stock = Beginning stock + CTC production – CTC sales – CTC sent to CFC plant

9.2 Chlorine (Cl_2) supply and consumption

Chlorine gas is fed to the chlorination reactors directly from chlor-alkali plant by pipeline without a storage tank.

Therefore, Cl_2 supply = Cl_2 consumption, there are no Cl_2 opening and closing stocks applied in the plant for Cl_2 supply and consumption records.

9.3 Methanol (CH_3OH) supply and consumption

Methanol is purchased from the outside and sent to a storage tank first, and then added into the CMs reactors.

CH_3OH supply is verified from the plant daily transfer records of CH_3OH from the outside supply to the CH_3OH storage tank.

CH_3OH consumption is measured by the daily CH_3OH transfer records from the methanol storage tank to the CMs reactors.

9.4 Verification Results

Table 9.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**3,395.89**	37,460.06	32,228.81	0.00

Table 9.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	0.00	76317.98	76,317.98	0.00
Methanol, MT	230.35	25354.33	25,512.25	72.44

Table 9.4.3 CTC production, stocks, and sales

Product	Beginning stock	CTC produced	CTC sales	Internal CFC uses*	Ending stock
CTC, MT	17.24	**3395.89**	2370.00	1043.13	0.00

* Sent to CFC plant for CFC 11 and CFC 12 production.

Table 9.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	CH_3OH/CTC, MT/MT
Theoretical	1.38	0.21
Actual	1.39	0.23

The number of 2003 operating days is 341.72 and the annual average CTC production per operating day is 9.94 MT/day.

For further details, please see ANNEX I-Table 9.

CTC 10: Guangzhou Hoton Chemical (Group) Co., Ltd.

The company is a former CTC producer, which was closed in 1997, and not visited during the mission.

CTC 11: Sichuan Honghe Fine Chemical Co., Ltd.

The company is a CMs producer that uses chlorine (Cl_2) and methane (CH_4) to produce carbon tetrachloride (CTC), chloroform (CM3), methylene chloride (CM2) and methyl chloride (CM1). Its CTC production quota for 2003 is **13,768.00 MT** and verified 2003 CTC production is **13,763.37 MT**.

11.1 CTC production, stock and sales:

The plant has two CMs production lines with 12 chlorination reactors. All CTC produced is sent to a process storage tank first, then transferred to CTC finished product storage tank after analysis, and then moved to CTC product warehouse after packaging for sales. By end of each month, all CTC remaining in the finished product storage tank was either drummed or placed into a storage tank in the CTC warehouse.

CTC production is defined as the amount of qualified CTC product transferred from the process storage tank to the CTC product storage tank.

CTC sales are measured by weighing while packaging and transferring the product from the CTC warehouse to the outside for sale – all CTC is packaged in either tank trucks or in some drums (250 kg).

CTC ending and beginning stocks are based on the CTC warehouse inventory. Readings are taken by the plant at 5:00 PM on the second to the last day of each month

11.2 Chlorine (Cl_2) supply and consumption

Chlorine is supplied by electrochemical factory of the company. The factory sends Cl_2 to different process units for liquid Cl_2, HCl and CMs production. The amount of Cl_2 sent to CMs lines is not measured by the CMs plant but calculated by the supplier based on following equation:

Cl_2 sent to CMs plant = Total Cl_2 generated – Cl_2 for liquid Cl_2 and HCl production

The supplied Cl_2 is fed to 12 chlorination reactors by pipeline directly, without the use of a storage tank. In some cases when Cl_2 from the chlor-alkali plant is not enough for CMs production, the CMs plant purchases Cl_2 from outside. Therefore, Cl_2 supply for CMs production = Cl_2 sent from chlor-alkali plant + Cl_2 procured from outside.

Cl_2 beginning and ending stocks are back calculated by the plant from the unfinished CTC, CM3, CM2 and CM1 products that remain in the process. Data records are taken from the Cl_2 inventories.

Cl_2 consumption for CMs is then determined by the plant based on the following balance:

Cl_2 consumption = Cl_2 supply for CMs + (beginning stock – ending stock)

11.3 Methane (CH_4) supply and consumption

Natural gas supplied from outside is purified by adsorption to remove impurities first, and then transferred by pipeline directly to the chlorination reactors without a storage tank. Monthly CH_4 supply for CMs production is recorded by the following:

CH_4 supply = Natural gas supply $\times$ CH_4 content (monthly average)

CH_4 beginning and ending stocks are not measured but back calculated by the plant from unfinished CMs products that remain in the process. Data records are taken from the plant's CH_4 inventories. CH_4 consumption is determined as below:

CH_4 consumption = CH_4 supply + (beginning stock – ending stock)

11.4 Verification results

Table 11.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**13,763.37**	16,780.40	22,966.89	1,181.18

Table 11.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	882.92	130,778.70*	130,783.71	877.90*
Methane, Nm^3	1,821,049	19,605,731**	19,616,608	1,810,172**

* Financial verification indicated that 131,189.35 MT of chlorine were procured in 2003 and no inventory was held. The difference may have resulted from (1) different from the production records, the financial department considers all purchased chlorine as the consumption because no storage tank exists, while the production department back calculated the Cl_2 amount from the process as the inventory; (2) the financial records took the invoiced amount as chlorine inputs while the production department applied the actual chlorine inputs as the procured. The 2004 verification will check whether this explanation is acceptable.

** Financial department recorded 21,194,030 Nm^3 of natural gas were procured and consumed in 2003. Also the difference may have resulted from (1) the financial inputs were the procured amount of natural gas while the production records are the methane; (2) the financial department recorded the purchase when it receives an invoice while the production department recorded the actual amount received.

Table 11.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC Produced	CTC sales	Ending stock
CTC, MT	216.25	**13,763.37**	13,841.48	138.14

Table 11.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	CH_4/CTC, Nm^3/MT
Theoretical	1.85	145.24
Actual	2.53	243.44

The number of operating days is 313.64 for 2003 and the annual MT CTC/operating day = 43.88 MT/day.

For further details, please see ANNEX I-Table 11.

CTC 12: Shanghai Chlor-Alkali Chemical Co., Ltd.

The company is a CTC co-producer that uses ethylene (C_2H_4) and chlorine (Cl_2) as raw materials to produce carbon tetrachloride (CTC) and perchloroethylene (PCE). In the

process, product output ratios of CTC/(PCE + CTC) are adjustable, ranged from 35% to 90%, by recycling the reactant back to the reactors. The company's 2003 CTC production quota is **7,209.00 MT** and the verified 2003 CTC production is **7,209.00 MT**.

12.1 CTC production, stocks and sales

The plant has two CTC unfinished product storage tanks (50m^3 each) and one CTC finished product tank (150m^3). CTC produced from the process is fed to the unfinished product tank first, and then, if qualified after analysis, transferred to the finished product storage tank. Disqualified CTC will return back to the system for reprocessing.

CTC production defined in the plant is the amount of qualified CTC transferred from unfinished product tank to the finished product tank.

CTC stock inventories are taken at 2:30 PM on the last day of each month.

CTC sales are verified from the product daily package and transfer records of CTC from the finished product storage to outside for sales.

12.2 Chlorine gas (Cl_2) supply and consumption

Chlorine gas (Cl_2) is fed to the chlorination reactor directly from chlor-alkali plant by pipeline without a storage tank. The amount of Cl_2 added into the reactor is measured by a flow rate gauge that equals the amount of Cl_2 consumed in CTC/PCE production and therefore, there is no Cl_2 stock inventory applied in the plant records.

12.3 Ethylene (C_2H_4) supply and consumption

Ethylene (C_2H_4) is supplied by Jingshan Petrochemical Company (50 km away from the plant) and added into the CTC/PCE reactor by pipeline directly from outside without a storage tank. Similar to Cl_2 supply records, daily ethylene supply is measured by a mass flow rate gauge that equals the amount of C_2H_4 consumed in the production of CTC/PCE. No ethylene stock inventory is recorded in the plant document.

12.4 Verification results

Table 12.4.1 CTC and PCE production

CMs	Carbon Tetrachloride (CTC)	Perchloroethylene (PCE)
Production, MT	**7,209.00**	3677.00

Table 12.4.2 Raw materials for CTC/PCE production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	0.00	19,157.79	19,157.79	0.00
Ethylene, MT	0.00	1,101.38	1,101.38	0.00

Table 12.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC produced	CTC sales	Other uses	Ending stock
CTC, MT	8.71	**7,209.00**	7,212.11	0.62*	4.98

* Internal uses in the plant for facility cleaning, see ANNEX I-Table 12.

Table 12.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	C_2H_4/CTC, MT/MT
Theoretical	1.38	0.09
Actual	1.63	0.078*

* Actual consumption ratio of C_2H_4 is below the theoretical value. The plant explained that the less amount of ethylene supply was measured and provided by the supplier and they did not correct the C_2H_4 flow rates.

The total operating days are 342.40 for 2003 and the annual MT CTC/operating day = 21.05 MT/day.

For further details, please see ANNEX I-Table 12.

CTC13: Quzhou Jiuzhou Chemical Co., Ltd.

The company is a CTC residue distillation plant that distills CTC residue purchased from its parent company, Zhejiang Juhua Fluorochemical Co., Ltd. and sells CTC as a final product. Its CTC production quota for 2003 is **596.00 MT** and the verified 2003 CTC production is **593.59 MT**.

13.1 CTC production, stock and sales

CTC production defined in the plant is the amount of CTC produced from the distillation columns to the CTC product warehouse.

CTC sales are measured by the product transfer records from the CTC product warehouse to outside for sale; all CTC is packaged in drums.

CTC stock inventories are determined by:

CTC ending stock = CTC beginning stocks + CTC production – CTC sales

13.2 CTC residue supply and consumption

CTC residue, the plant's raw material, purchased from Zhejinag Juhua Fluorochemical Co., Ltd., is delivered to the plant raw material storage tank first, and then added into distillation columns for recovering CTC in a batch process.

CTC residue supply is defined as the amount of CTC residues transferred from Zhejinag Juhua Fluorochemical Co., Ltd. to the plant's raw material storage tank.

CTC residue beginning and ending stocks are from the raw material storage inventory. Readings are taken at 12:00 AM on the last day of each month.

Then, CTC residue consumption = CTC residue supply + (beginning stock - ending stock)

13.3 Verification results

Table 13.3.1 Raw material consumption

Raw material	Beginning stock	Procured or added to stock	Consumption	Ending stock
CTC residue, MT	40.00	863.35	883.35	20.00

Table 13.3.2 CTC production, stocks and sales

Product	Beginning stock	CTC produced	CTC sales	Ending stock
CTC, MT	16.50	**593.59**	497.10*	113.00*

* Financial verification indicated that the plant sold 507.59 MT of CTC and held 102.5 MT CTC as closing stock by end of the year. This is due to the different recording approaches applied in the plant. The production department records the sales when CTC was sent out of warehouse while the financial department records the sales when it receives invoices. Both the verified data are balanced.

Table 13.3.3 Raw material consumption ratio

Ratios	CTC residue (raw material)/CTC product, MT/MT
Theoretical	N/A
Actual	1.49

The 2003 total operating days are 334 and the annual production of CTC per operating day is 1.78 MT/day.

For further details, please see ANNEX I-Table 13.

CTC 14: Wuxi Greenapple Chemical Co., Ltd.

The company is a new CMs producer that uses chlorine (Cl_2) and methanol (CH_3OH) to produce chloroform (CM3), methylene chloride (CM2) and carbon tetrachloride (CTC) as co-products. The plant was built in June 2003 and started producing CMs in August

2003. Its 2003 CTC production quota is **500.00 MT** and the verified production is **495.15 MT**.

14.1 CTC production, stocks and sales

The produced CTC is sent to an unfinished CTC storage first, and then transferred to the CTC finished product tank after analysis. Disqualified CTC is returned to system for reprocessing.

CTC production is defined as the amount of qualified CTC transferred from the unfinished product storage tank to the finished product storage tank.

CTC sales are measured by daily transfer records of CTC from the finished product storage tank to outside for sale.

CTC beginning and ending stocks are from the CTC product storage inventory. Readings are taken by the plant on the 25th day of each month.

14.2 Chlorine (Cl_2) supply and consumption

Liquid chlorine is supplied by Chlor-Alkali Factory of the company, which is sent to a liquid storage tank first, and then vaporized and fed into CMs reactor by pipeline. No measurement is applied in the plant to measure the amount of liquid Cl_2 transferred from Chlor-Alkali Factory to the liquid Cl_2 tank. Cl_2 supply from the Chlor-Alkali Factory is estimated by the supplier based on the following allocation balance:

Cl_2 supply for CMs = Total Cl_2 generated from chlor-alkali process – other uses in the company for producing VCM, PVC, Chlorinated Rubber, HCl and liquid chlorine etc.

Cl_2 beginning and ending stocks are estimated by Cl_2 level in the liquid Cl_2 tank and no original records were kept.

There is no measurement of Cl_2 from the liquid Cl_2 tank to the CM reactor and, therefore, Cl_2 consumption is calculated by the plant as the following:

$$Cl_2 \text{ consumption} = Cl_2 \text{ supply} + (\text{beginning stock} - \text{ending stock})$$

14.3 Methanol (CH_3OH) supply and consumption

Methanol is purchased from outside. The procured CH_3OH is sent to a storage tank first, and then added into the CMs reactors.

CH_3OH input from the outside to the storage tank is measured and recorded by the plant daily raw material transfer records.

CH_3OH beginning and ending stocks are taken from the CH_3OH storage inventory. Then the CH_3OH consumption is determined by:

CH_3OH consumption = CH_3OH procured + (beginning stocks – ending stock)

14.4 Verification results

Table 14.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**495.15**	4,205.33	4,039.65	0.00

Table 14.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	0.00	8,751.80	8,432.80	319.00
Methanol, MT	0.00	3,557.23	3,435.73	121.50

Table 14.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC produced	CTC sales	Other uses	Ending stock
CTC, MT	0.00	**495.15**	371.01	42.14*	82.00

* Internal uses in the plant for chlorinated rubber production.

Table 14.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	CH_3OH/CTC, MT/MT
Theoretical	1.38	0.21
Actual	1.29	0.26

The 2003 total operating days are 126.42. The annual production of CTC per operating day is 3.92 MT/day.

For further details, please see ANNEX I-Table 14.

CTC 15: Shandong Jinling Group Company

The company is a new CMs producer that uses chlorine (Cl_2) and methanol (CH_3OH) to co-produce carbon tetrachloride (CTC), chloroform (CM3) and methylene chloride (CM2). The plant started producing CMs from October 2003. Its CTC production quota for 2003 is **150 MT** and the verified production is **147.74 MT**.

15.1 CTC production, stocks and sales

CTC produced in the process is sent to an unfinished product tank. Then its composition is analyzed and, if qualified, transferred to the CTC finished product storage for packaging sales.

The definition of CTC production applied in the plant is the amount of CTC transferred from the unfinished product tank to the finished product storage by summing up the amount of CTC from the corresponding CTC transfer records.

CTC stock inventory is taken by the plant at 8:00 AM each day.

No CTC movement records from finished product storage to outside for sales are provided by the plant. The plant claimed that all CTC produced in 2003 was stored in product storage tanks and no sales were made in the production year. However, financial verification found that 91.08 MT CTC was sold in 2003.

15.2 Chlorine (Cl_2) supply and consumption

Cl2 supplied by the company's Chlor-Alkali Plant is transferred to feedstock storage first, and then fed into the CMs reactor.

Daily shift production logs for Cl2 movement from outside to Cl2 storage and from the Cl2 storage to CMs reactor are recorded by the plant and provided for production verification. However, financial verification presented a different result.

15.3 Methanol (CH_3OH) supply and consumption

CH3OH is purchased from outside and sent to feedstock storage first, and then fed into the CMs reactor. Daily shift production logs for CH3OH movement from outside to the CH3OH storage and from the CH3OH storage to CMs reactor are recorded by the plant and provided for verification. However, financial verification showed different results.

15.4 Verification results

Table 15.4.1 Chloromethanes (CMs) production

CMs	CTC	Chloroform	Methylene Chloride	Methyl Chloride
Production, MT	**147.74**	3,238.09	4,204.85	0.00

Table 15.4.2 Raw materials for CMs production

Raw Materials	Beginning stock	Procured or added to stock	Consumption	Ending stock
Chlorine, MT	121.95	8,500.85*	8,559.38*	39.70
Methanol, MT	300.12	2,781.58*	2,977.17*	104.52

* Financial verification found that the company (1) allocated part of both chlorine and methanol consumed in CMs production to other production lines, and (2) procured

4,334.32 MT of methanol in 2003 and sold out 100 MT leaving a net purchase of 4,234.32 MT CH_3OH for productions. The company explained that, except for CMs, the purchased CH_3OH was also used in other production.

Table 15.4.3 CTC production, stocks and sales

Product	Beginning stock	CTC produced	CTC sales	Ending stock
CTC, MT	0.00	**147.74**	0.00*	147.74*

* Financial verification found that the 91.08 MT of CTC was sold in 2003 which result an ending stock of 56.66 MT. The company refused to provide financial documents for further confirmation.

Table 15.4.4 Raw material consumption ratios

Ratios	Cl_2/CTC, MT/MT	CH_3OH/CTC, MT/MT
Theoretical	1.38	0.21
Actual	1.57	0.25

The Verification Team could not further verify the financial findings as we were not allowed to have full access to the company's financial records to review and check up all the related documents.

The 2003 number of operating days is 84.00 and the annual average CTC production per operating day is 1.76 MT/day.

For further details, please see ANNEX I-Table 15 and ANNEX II.

FEEDSTOCK USERS

CTC F1: Juhua Lanxi Agrochemical Co., Ltd.

The company is a CTC feedstock consumer that uses styrene and CTC as raw materials to produce cinnamic acid. This feedstock application has been verified by SEPA in accordance with the principles of the Montreal Protocol. The present production capacity of the plant is 500 MT with plans to expand the production to 1,000 MT in 2005. The use of CTC as feedstock in 2003 is verified as **243.88 MT**.

F1.1 Process Description

Cinnamic acid ($C_6H_5CH=CHCOOH$) is a chemical used for synthesizing edulcorant, medicine, spices and photosensitive resin, etc. In the plant, the process essentially involves in a two-step organic synthetic reaction that consume CTC and styrene as feedstock for producing cinnamic acid:

1) Synthesis Reaction: $C_6H_5CH=CH_2 + CCl_4$ (CTC) $\rightarrow C_6H_5CHClCH_2CCl_3$
2) Hydrolysis Reaction: $C_6H_5CHClCH_2CCl_3 + H_2O \rightarrow C_6H_5CH=CHCOOH + 4HCl$

In the first step, CTC is chemically transformed to an aromatic chloride intermediate, which is then separated and purified by distillation. Then following the second step the aromatic chloride intermediate is further reacted with water to form cinnamic acid as the final product.

F1.2 Cinnamic acid production, sales and stocks

Cinnamic acid production is measured by the amount of qualified product transferred from the manufacturing process to the finished product storage. The cinnamic acid transferred to the finished product storage is recorded by daily product transfer records.

Cinnamic acid sales are measured by the product daily transfer records from the finished product storage to outside for sale.

Cinnamic acid beginning and ending stocks are taken from the product storage inventory. Readings were taken by the plant at 8:00 AM on the second to last day of each month.

F1.3 CTC supply, consumption and stocks

Carbon tetrachloride (CTC) purchased from its parent company, Zhejiang Juhua Fluorochemical Co., Ltd. is sent to a large storage tank first, then transferred to a feedstock tank where CTC is fed to synthetic reactors for cinnamic acid production.

CTC procured from Juhua is recorded by the plant CTC transfer records from outside to the large storage tank.

CTC added to the feedstock storage is recorded by the plant CTC transfer records from the large storage to the feedstock tank.

CTC beginning and ending stocks based on the feedstock storage tank inventory. Readings are taken by the plant at 8:00 AM on the second to last day of each month.

CTC consumption is determined by the feedstock storage balance:

CTC consumption = CTC added to feedstock tank + (beginning stock – ending stock)

F1.4 Verification results

Table F1.4.1 Cinnamic acid production, stocks and sales

Product	Beginning stock, MT	Production, MT	Sales, MT	Ending stock, MT
Cinnamic acid	9.15	134.50	75.49	68.12

Table F1.4.2 CTC supply, consumption and stocks

Feedstock	Procured	Beginning stock	Added to stock	Consumed	Ending stock
CTC, MT	233.62	10.58*	241.12*	**243.88**	7.82*

* Balance on the CTC feedstock storage.

Table F1.4.3 CTC consumption ratio

Ratios	CTC/Cinnamic Acid, MT/MT
Theoretical	N/A
Actual	1.81

The number of operating days is 265 days for 2003 and an annual MT cinnamic acid produced per operating day is 0.51 MT/day.

For further details, please see ANNEX I-Table 16

CTC F2: Yongkang Sanhaun Chemical Co., Ltd.

The company is a CTC feedstock consumer using carbon tetrachloride (CTC), ethylene (C_2H_4) and hydrogen fluoride (HF) as feedstock to produce 3,3,3-trifluoropropene (TFP). The CTC feedstock application has been verified by SEPA in accordance with the principles of the Montreal Protocol.

TEP is a non-ODS chemical intermediate mainly used in fluorochemical and fluorinated silicone rubber production. The plant's production capacity is 500 MT and, in 2003, the use of CTC as feedstock is verified as **351.79 MT.**

F2.1 Process Description

First, CTC is completely transformed to tetrachloropropane (TCP) by reacting with ethylene in a high-pressure polymerization reactor. Second, the produced TCP is further reacted with hydrogen fluoride (HF) to form trifluorochloropropane (TFCP) intermediate, and then applying NaOH to accomplish removing chlorine and creating a double bond to form the final product 3,3,3-trifluoropropene (TFP).

F2.2 TFP production, sales and stocks

TFP production is defined as the amount of finished product transferred from the process to the final product storage tank and determined by the following balance:

TFP production = TFP sales + TEP storage ending stock – TEP storage beginning stock

TFP sales are measured by the product packaging and weighing operation. Original data are from the plant daily transfer records out of the storage for sale.

TFP storage beginning and ending stocks are based on the final product storage inventory. Readings are taken by the plant at 8:00 AM on the 26th day of each month.

F2.3 CTC supply, consumption and stocks

CTC consumed in the plant is mainly supplied by Juhua Fluorochemical Co., Ltd. via a trading company, Quzhou City Longyuan Trading Co., Ltd. The purchased CTC is delivered to a large storage tank first, and then transferred to a feedstock tank where CTC is fed to reactor for TFP production.

CTC procured from outside is weighed and recorded by the plant CTC transfer records from outside to the large storage tank.

CTC transferred from large storage tank to feedstock tank is measured and recorded by the plant CTC transfer records.

CTC beginning and ending stocks are taken from the feedstock tank at 8:00 AM on the second to last day of each month. Then the amount of CTC used as a feedstock for TFP production is determined by:

CTC consumption = CTC added to feedstock storage + (beginning stock – ending stock)

F2.4 Verification results

Table F2.4.1 TEP production, stocks and sales

Product	Beginning stock	Production	Sales	Ending stock
TEP, MT	0.74	106.77*	105.98*	1.53

* Financial verification found 108.66 MT TFP produced and 88.68 MT TFP sold, which are different from the production verification numbers included in the above table. However, no original financial documents and daily account transactions were checked because the company would not provide the documents.

Table F2.4.2 CTC supply, consumption and stocks

Feedstock	Procured	Beginning stock	Added to stock	Consumed	Ending stock
CTC, MT	362.50	30.28*	362.50*	**351.79**	40.99*

* Balance on the CTC feedstock storage.

Table F2.4.3 CTC consumption ratio

Ratios	CTC/TEP, MT/MT
Theoretical	1.67
Actual	3.32*

* In the synthesis of 3,3,3-trifluoropropene, many byproducts or impurities are made as well and that is why the CTC/TFP ratio is much higher than the theoretical.

The 2003 total operating days are 301.00 and the annual average TFP production per operating day = 0.35 MT/day.

For further details, please see ANNEX I-Table 17

ANNEX

ANNEX I Table 01: **Luzhou North** 2003 CTC Production Verification Report

ANNEX I Table 02: **Zhejiang Juhua** 2003 CTC Production Verification Report

ANNEX I Table 04: **Chongqing Tianxuan** 2003 CTC Production Verification Report

ANNEX I Table 05: **Chongqing Tiansheng** 2003 CTC Production Verification Report

ANNEX I Table 06: **Chongqing Tianyuan** 2003 CTC Production Verification Report

ANNEX I Table 08: **Luzhou Xinfu** 2003 CTC Production Verification Report

ANNEX I Table 09: **Jiangsu Meilan** 2003 CTC Production Verification Report

ANNEX I Table 11: **Sichuan Honghe** 2003 CTC Production Verification Report

ANNEX I Table 12: **Shanghai Chlor-Alkali** 2003 CTC Production Verification Report

ANNEX I Table 13: **Quzhou Jiuzhou** 2003 CTC Production Verification Report

ANNEX I Table 14: **Wuxi Greenapple** 2003 CTC Production Verification Report

ANNEX I Table 15: **Shandong Jinling** 2003 CTC Production Verification Report

ANNEX I Table 16: **Lanxi Agrochemical** 2003 CTC Feedstock Verification Report

ANNEX I Table 17: **Yongkang Sanhuan** 2003 CTC Feedstock Verification Report

ANNEX II: Financial Verification of 2003 CTC Production in China

ANNEX II

FINANCIAL VERIFICATION OF 2003 CTC PRODUCTION IN CHINA

Financial Verification Approach

At the beginning, the accounting system was checked to determine its reliability. For example, the method of producing accounting records was asked. If the company used a set of software to produce accounting records, the accounts, ledger and vouchers were randomly checked. If the company produced ledgers and reports by hand, the various ledgers and vouchers were reviewed.

Then, all of the ledgers related to raw material purchase, storage, and transfer, CTC production, transfer and sales were checked. Then by following the track number, accounting vouchers were checked and original documents were reviewed. In this procedure, the inconsistency would be tracked and be questioned. Explanation was required until the inconsistency was reasonably answered. At the same time, the reliability of accounting system was reviewed.

Based on the verification mission, it was found the following inconsistencies between the data gotten from financial department and that from the production verification:

A. The raw material inventory amount: Usually the financial department uses the raw material amounts in the warehouse as the inventory amount. However, the production department counted the raw material in the production line as inventory as well.

B. The raw material consumption amount: Financial department uses the transfer amount from the warehouse to the production line as the raw material consumption while the production department takes the raw material amount in the final products as consumption.

C. The sales amount determined from the financial records might be different from that of the production results. The financial department only records sales after it receives an invoice from the buyer while the warehouse records the sales when the products go out of the warehouse.

CTC 01: Luzhou North Chemical Industrial Co. Ltd.

Contact person:

Xie Qiang, Deputy Director-Financial Department
Zeng Min, Financial Staff from Ltd.
Ming Zhigang, Financial Staff

Wang Xuefeng, Financial Staff

Luzhou North Chemical Industrial Co. Ltd. is a military company. At least, 25% of CTC was produced from the CMs production line.

A. Internal Control System:

Luzhou Xinfu mainly produced financial records by hand. They have been moving forward to accounting software since Oct. 2003.

As Luzhou Xinfu was a wholly state-owned company, internal transferring price was used in the transaction between each subsidiary plant. At the same time, parent company was responsible for all of financial recording and reports. No accounting system was established in the subsidiary plant.

Chlorine: Chlorine was produced for sales, purifying water and producing CMs. No tank was used for chlorine storage. The chlorine output amount was calculated based on that 0.885 MT of chlorine was produced from each electrical-chemical unit. The consumption amount of chlorine was determined from the equation: the CTC consumption amount = Calculated output of chlorine - usage for liquid chlorine - water purification treatment. From the parent company records, there were only the total raw material costs for each subsidiary for every month. Therefore, the only way to check the consumption was to go down to the plant cost sheets. Spot checking was used in verifying this amount as there were a lot of data involved.

Methanol: Methanol was purchased in total from the outside by the parent company. The plant obtained directly from the parent company's warehouse. The financial department used the yearly settled priced to record the raw material costs. At the end of each month, the price difference would be adjusted. The parent company used the amount transferred to subsidiary as the consumption amount in its financial recording. Any loss happened in the transportation and inventory would be counted into the administration expenses. Hence, the actual transferring amount was equal to the consumption amount in the financial records of parent company.

CTC and Co-products: The financial department used the sales amount as the CM3 production amount recorded. Therefore, there was no inventory of CMs on the financial records.

The financial department combined all transactions in January and February as one month because of Spring Festival Day.

Luzhou North showed a good ability in financial management. However, as the parent company grouped many products/raw materials into one account, it was difficult to verify a specific production or a specific material consumption from their financial records.

B. Conclusion:

CTC: In 2003, 2,045.73 MT of CTC were produced and sold out by Luzhou North.

Chlorine: 7,681.866 MT of chlorine were obtained and consumed by Luzhou North in 2003.

Methanol: 1,517.541 MT of methanol were purchased and consumed by Luzhou North in 2003.

CM3: 3199.443 MT of CM3 were produced and sold out by Luzhou Xinfu in 2003.

CTC 02: Zhejiang Juhua Fluorochemical Co., Ltd.

Zhejiang Juhua is a state-owned chemical enterprise, which produces multiple chemicals.

A. Internal Control

Zhejiang Quhua computerized its accounting system. It showed a high capability in the internal control system. The inconsistency between the data of the accounting system and that from production department was:

The financial department used the amount showed on the invoice as the purchased amount, while the production department used the actual received raw material to get the raw materials received. And at the same time, the accounting department used the formula: Raw material consumption = beginning inventory + purchase amounts - ending inventory to get input amounts. The production department uses the actual material input amount as the consumption amount. Therefore, a difference existed in the raw material consumed from the records of the production department from that of the accounting department.

In addition, Zhejiang Quhua calculated the raw material amount included in the in-process products and debits this amount as inventory. Therefore, the raw material inventory amounts from the financial department were different from that of the production department.

B. Conclusion:

From financial documents provided by Zhejiang Quhua, the following information was verified:

In 2003, Zhejiang Quhua produced 16,203.74 MT of CTC. With the beginning inventory of 1,538 MT, annual sales of 2,329.41 MT and self-usage of 15,241.41 MT, Zhejiang Quhua kept an ending inventory of 170.92 MT for 2003.

Chlorine consumption: From the financial documents, 106,837.509 MT of chlorine was consumed in the production of CTC. With the beginning inventory of 1,555.93 MT and the purchase of 105,784 MT, Zhejiang Quhua kept an ending inventory of 502.421 MT.

Methanol consumption: From financial documents, 31,142.974 MT of methanol was consumed in the production of CTC. With the beginning inventory of 501.048 MT and input of 30,874.81 MT, Zhejiang Quhua kept an ending inventory of 232.874 MT.

CTC 04: Chongqing Tianxuan Chemical Co. Ltd.

On Dec. 26, 2003, the production was stopped and on Dec. 31, 2003, Chongqing Tianxuan dismantled its CTC production line. And the dismantling finished on Jan. 9, 2004 under supervision of Changshou local EPB.

A. Internal Control:

All of financial records and reports were produced by hand. No computer was used in the financial management.

Chlorine and Natural Gas: were purchased from its previous parent company, Chongqing Changshou Co.,Ltd. Since Chongqing Tianxuan could accrue the actual expenses and use its accounts payable to finally make the whole year payment at the end of each year, the actual monthly consumption may not be equal to the invoice amount even though no inventory was held by Chongqing Tianxuan.

Chlorine: In 2003, some of purchased chlorine was resold to the outside. Therefore, the total input amount into the production line should be equal to the purchase amount minus resale amount.

Several problems were found in the verification.

a. More time is needed to find the financial records and the original documents. They showed some disability of efficient financial management.

b. Incomplete records in the ledger. It was difficult to understand the transaction because of inadequate remarks.

c. Used different accounts to record similar transactions.

However, even with such inefficient factors, generally, Chongqing Tianxuan showed consistence in financial records with original documents.

Conclusion:

CTC: In 2003, 869.85 MT of CTC was produced by Chongqing Tianxuan. With the beginning of 369.075 MT, the sales of 1,238.16 MT, and other usage of 0.335 MT, Chongqing Tianxuan held an ending CTC inventory of 0.43 MT.

Chlorine: 2,760.895 MT of chlorine was consumed in 2003.

Natural Gas: 305,583 Nm^3 was put into CTC production line.

CTC 05: Chongqing Tiansheng Chemical Co. Ltd.

Contact person: Lan Lirong: Director of Financial Department

Chongqing Tiansheng received CTC residue from Chongqing Tianyuan and Luzhou Xinfu.

A. Internal Control System

Even though Chongqing Tianyuan used a set of accounting software to produce their financial records and reports, all of data on reports and records were inputted by a financial person one by one as there was no calculation function designed in the accounting software.

All losses were directly added to the production costs.

CTC residue: CTC residue tank was cleaned at the end of each year. Therefore, no CTC residue inventory was held by Chongqing Tiansheng at the end of 2003.

Several problems were found in the verification:

a. Some original documents were inconsistent with each other. The financial people explained that the inconsistency resulted from errors in writing. As the difference was less than 1 MT, it was considered as unimportant and the verification team accepted the company's explanation.

b. One mistake was found in the financial reports, a sales amount under the sales revenue account was inconsistent with what was obtained from the original documents and ledgers. Chongqing Tiansheng found the mistake that a wrong number was put into the reports.

B. Conclusion:

CTC: 129.8 MT of CTC was produced in 2003 and 115.94 MT of CTC were sold. With the beginning inventory of 0 MT, Chongqing Tiansheng had an inventory of 13.86 MT at the end of 2003.

CTC Residue: In 2003, Chongqing Tiansheng purchased and consumed 513.332 MT of CTC residue from Chongqing Tianyuan and Luzhou Xinfu.

CTC 06: Chongqing Tianyuan Chemical General Plant

Chongqing Tianyuan was established in 1939. The main products were CTC and CM3.

A. Internal Control:

The financial reports and records were produced by hand. There were no more than 20 computers in the whole company. As Chongqing Tianyuan operated at a loss, it was very difficult for Chongqing Tianyuan to purchase more computers and a set of accounting software to improve its financial management system.

Chlorine: Chlorine was produced internally. By applying a consumption ratio provided by pilot production, the chlorine costs were allocated to each user as its consumption amount. Hence, it was concluded that the consumption amount of chlorine didn't make much sense to verify its CTC production amount. In addition, the consumption amount of chlorine from Chongqing Tianyuan was the amount allocated only to CTC products, while other enterprises used the whole chlorine consumption for CMs production line as the consumption amount.

Natural Gas: Chongqing Tianyuan bought natural gas from the outside. A flow meter was used to measure the consumption amount. No tank or warehouse was used for inventory of natural gas. Therefore, the purchase amount was equal to the consumption amount and there existed no beginning and ending inventories.

The consumption amount of natural gas is only for CTC products. The natural gas consumption for CM3 was deducted from the production cost.

The financial department didn't record quantities with RMB amount on the financial records. The verification had to be conducted by tracking the consumption amount from the cost allocation sheet from the production department.

Several problems were found in the verification:

a. Several financial records had the wrong sub-ledger number.
b. Some signatures of makers were not on financial records.

Based on available documents, it was reasonable to say that the financial management system of Chongqing Tianyuan provided trustworthy records even though it needed improvement on its cost tracking system.

B. Conclusion:

In 2003, Chongqing Tianyuan produced 6,114.185 MT of CTC, sold 6,742.734 MT of CTC and used internally 0.05 MT of CTC. Balanced with a beginning inventory of 1,263.562 MT, Chongqing Tianyuan held an inventory of 634.963 MT of CTC at the end of 2003.

Chlorine: In 2003, Chongqing Tianyuan consumed 15,482.88 MT of Chlorine. No inventory was held.

Natural Gas: In 2003, Chongqing Tianyuan purchased and consumed 1,722,274 NM^3 of natural gas.

CTC 08: Luzhou Xinfu Chemical Industry Co. Ltd.

Contact person: Yan Nu, Director of Financial Department

Luzhou Xinfu produced CTC, CM3 and CM2. Most of the output was CTC and CM3. Only very little CM2 was produced and used internally for cleaning. In 2003, production costs increased because of shutting down and restarting the production line frequently to control the production amount.

A. Internal Control:

Luzhou Xinfu uses windows-based accounting software. It showed efficiency in tracking each transaction and consistence in the financial records and reports. At the same time, it was easy to read its standardized financial records and reports.

Chlorine: Produced internally. According to the designed chlorine output ratio, Luzhou Xinfu calculated the production amount of chlorine. The ratio of 0.885 MT of chlorine from each electro-chemical unit was used to calculate chlorine output amount. Then, deducting the consumption amount for other usages, all of the remaining chlorine was assumed to be consumed by the CTC production line. Hence, there was no inventory at the beginning and ending of 2003.

Natural gas: Multi-usage. Luzhou Xinfu purchased natural gas from outside. Meters were used in measuring each distribution to end-users. The difference from the supplier and distributor meters was allocated to each user. Therefore, it was concluded that there was no need to verify the purchased amount as the purchased amount gave no indication on the real CTC consumption of natural gas. As natural gas was transferred by pipeline and no tank was installed for storage, no inventory of natural gas was held by Luzhou Xinfu.

The only problem found in the verification was that several invoices were missing. Even though the financial records and reports showed this transaction and they provided a copy of invoice for storage, the original invoices were not found.

Generally speaking, the accounting system of Luzhou Xinfu was reliable.

B. Conclusion:

CTC: In 2003, 5,203 MT of CTC were produced. With the beginning inventory of 196.2989 MT, sales of 4,925.251 MT, Luzhou Xinfu held an ending inventory of 474.0481 MT of CTC.

(The inventory amount was based on invoices issued. Therefore, there might be some difference from data from production verification as they counted the actual amount in the warehouse.)

CM3: 401 MT of CM3 was produced in 2003.

Chlorine: In 2003, 15,773.72 MT of chlorine was transferred and consumed by the CTC production line.

Natural Gas: 1,866,861 Nm^3 of natural gas was purchased and used in the CTC production line in 2003.

CTC 09: Jiangsu Meilan Chemical Co. Ltd.

Jiangsu Meilan uses internal produced CTC for its CFC production. At the same time, it sold part of CTC products to the outside.

A. Internal Control:

Jiangsu Meilan used a windows-based computerized accounting system. However, the verification team had no opportunity to check the accounting system as the financial department was located in another location and there was no time remaining to visit that location.

Chlorine: Internally produced. The actual transfer amount measured by one flow meter was used by the accounting department as the total consumption amount of the current period. Because chlorine was transferred by pipeline, the beginning and ending inventories were zeros for CTC plant. The transferred amount was used as the actual consumption amount.

Methanol: Methanol was purchased from the outside. The methanol was received in the plant without an invoice and would be entered into financial records as an estimate. At the beginning of the following month, the counter record was produced to adjust the balance. The estimated cost of methanol was based on the last available price.

If there was any loss in the transportation of raw materials, the accounting department directly decreased the purchased amount and increased the unit cost to cover the loss. For example, in October 2003, Jiangsu Meilan purchased 800 MT of methanol from Shanghai

Jiaohua Company. With the loss of 8.98 MT in transportation, the accounting department recorded as 791.02 MT.

There were several problems found in the verification:

Several original documents were missing. For example, the chlorine consumption amount of August had only a cost allocation sheet, but no warehouse transfer slip.

It was found in several instances that backup documents were mis-attached.

There was a negative amount in CTC inventory at the end of August and September; Jiangsu Meilan explained that the gain and loss in inventory made these kinds of things happen. The gain was adjusted into CFC costs in October.

It was suggested that the warehouse use the separate slips to record different products for better tracking in the future.

Based on the information provided, it is reasonable to say that the financial reports are consistent with the records and records are consistent with the original documents.

B. Conclusion:

CTC: In 2003, 3,395.89 MT of CTC were produced. With the beginning inventory of 17.24 MT, sales of 2,370 MT and self usage of 1,043.13 MT, Jiangsu meilan held an ending inventory of 0 MT.

Chlorine: In 2003, the total transfer and consumption amount was 76,347.96 MT. No inventory was held by the company.

Methanol: In 2003, Jiangsu Meilan consumed 25,512.24 MT of methanol. With the beginning inventory of 230.351 MT and the purchased amount of 25,354.326 MT, Jiangsu meilan held an ending inventory of 72.435 MT.

CTC 11: Sichuan Honghe Fine Chemical Co. Ltd.

Contact person: Luo, Jie, Director of Financial Department

Sichuan Honghe had two production lines. One focused on the production of CTC. The other production line primarily produced CM2. A new production line was under construction.

A. Internal Control System:

Sichuan Honghe's financial records were hand prepared.

Chlorine: Sichuan Honghe purchased chlorine from another subsidiary under the same parent company. The invoiced amount was used as the actual consumption because a pipeline was used in transportation and no storage tank was used in Sichuan Honghe.

Natural gas: Sichuan Honghe bought natural gas from the outside. It was supplied by pipeline. If no invoice was received at the end of each month, the financial department estimated the consumption amount and allocated costs. When the invoice came in the following month, the estimated costs would be adjusted in that period.

CTC production: Financial department used the report from the production department to record the actual production. Even with the warehouse document in hand, the financial department didn't check them one by one.

In the verification, it was found that the financial department of Sichuan Honghe showed an ability of quick tracking their financial records, even with the hands-produced accounting records. It was reasonable to conclude that the financial records of Sichuan Honghe were reliable.

B. Conclusion:

CTC production: In 2003, 13,763.374 MT of CTC were produced by Sichuan Honghe. 13,841.48 MT of CTC were sold in the same year. With the beginning inventory of 216.25 MT, Sichuan Honghe held a CTC inventory of 138.144 MT at the end of 2003.

Chlorine: In 2003, 131,189.347 MT of chlorine were purchased and consumed by Sichuan Honghe. No inventory was held.

Natural Gas: In 2003, 21,194,030 Nm^3 of natural gas were purchased and consumed by Sichuan Honghe. No inventory was held at the beginning and end of 2003.

CM1: 1,181.177 MT of CM1 was produced by Sichuan Honghe in 2003.
CM2: 22,966.891 MT of CM2 was produced by Sichuan Honghe in 2003.
CM3: 16,780.397 MT of CM3 was produced by Sichuan Honghe in 2003.

CTC 12: Shanghai Chlor-Alkali Chemical Co. Ltd.

Main product of the CTC production line is CTC and by-products are perchloroethylene (PCE) and HCL. The production ratio can be adjusted in the system.

A. Internal Control system:

Shanghai Chlor-Alkali used self-developed DOS-based accounting software to produce financial records and reports. However, as the company is involved in a lot of businesses, many original documents were stored separately from the corresponding financial

vouchers. Financial people use the cost reports from the production department to make records.

Chlorine: Self-produced. It was transferred from the chlor-alkali plant of Shanghai Chlor-Alkali. Cost allocation was based on the production cost, not on the market price. As Shanghai Chlor-Alkali used a pipeline to transfer chlorine and a united amount was used to determine the costs for both the financial department and the production department. Therefore, in this company, the purchase amount = input into the production line = the consumption amount.

Ethylene: It was purchased both for the CTC and PVC production lines. As PVC uses most of the ethylene, the loss in the transportation was allocated to PVC production. CTC production uses the actual input amount as the raw material consumption.

CTC production cost allocation: As the CTC production line produced PCE at the same time. The accounting department didn't track the exact cost of CTC production. The average cost, which was obtained by dividing the total costs by the total production amount of CTC and PCE, was used as the cost for both CTC and PCE. As the ratio of final output of CTC and PCE changed over the year, it was impossible to use cost component analysis to track any deviation from normal production.

One problem was found in the verification:

There was a mistake when recording the cost reported from the production department to the financial department. 856.44 MT of chlorine instead of 956.44 MT were recorded as consumption in August 2003 even though the RMB amount was correct.

Based on the documents provided, it was reasonable to say that Shanghai Chlor-Alkali operated a reliable accounting system.

B. Conclusion:

CTC production: In 2003, Shanghai Chlor-Alkali produced 7,209 MT of CTC. With a beginning inventory of 8.712 MT, the sales of 7,212.105 MT and a self-usage of 0.62 MT for cleaning, the company kept an ending inventory of 4.987 MT in 2003.

Chlorine Consumption: In 2003, Shanghai Chlor-Alkali consumed 19,157.79 MT with the zero inventories both at the beginning and ending of the year.

Ethylene: As most of ethylene was purchased for the PVC production line, it was thought that the beginning inventory and ending inventory gave no clue in the CTC production. In 2003, Shanghai Chlor-Alkali purchased 112,748.475 MT of ethylene, and consumed 1,101.67 MT in CTC production line.

CTC 13: Quzhou Jiuzhou Chemical Co. Ltd.

Quzhou Jiuzhou Chemical Co. Ltd. uses CTC residue from Zhejiang Quhua to produce CTC through distillation.

A. Internal Control System:

All of accounting records were made by hand. Basically, it followed the accounting system in Quhua as the accounting person in charge was a retiree from Quhua. However, as Quzhou Jiuzhou is a small private enterprise with the capital of US$3 million and was established in 1995, there wasn't a complete and systemized accounting system that existed in the enterprise. The main problems were:

a. There was no cost tracking system. The accounting staff was reported to by the production staff orally about the qualified and unqualified final products at the end of each month. The accounting person will use the total amount of qualified CTC products and unqualified products* RMB1, 200 to get the material costs. Therefore, no appropriate approach was used to verify the raw material costs as there were no records on the unqualified CTC products.

b. Timing inconsistence. -0.25 MT of inventory appeared at the end of January because of inconsistency in the timing of accounting system. On Jan. 27, 10 MT of CTC were sold to Jiande Xin'an Chemical group. It was recorded as sales in Jan. However, only from Jan. 1 to Jan. 25, CTC production outputs were recorded as Jan. inventory. From Jan. 26, CTC outputs were recorded as production in Feb.

c. There were no accountants' signatures showing on the accounting records.

d. Inventory recording system needs to improve. As the financial department just used the monthly orally report from warehouse to do accounting records, the raw material received in the warehouse might not be shown in the accounting records.

Even with above-mentioned problems, it was found Quzhou Jiuzhou provided consistent numbers related with CTC production.

B. Conclusion

With restrictions mentioned above, the accounting records were checked.

In 2003, the total production was 593.59 MT. 507.59 MT of them was sold out. With the beginning inventory of 16.5 MT, 102.5 MT of CTC was in inventory for the future sales at the end of 2003.

Quzhou Jiuzhou purchases CTC residue from Zhejiang Quhua. In 2002, Quzhou Jiuzhou purchased 863.02 MT tons of CTC residue and consumed 883.02 MT with a beginning inventory of 40 MT and an ending inventory of 20 MT.

CTC 14: Wuxi Greenapple Chemical Co. Ltd.

In July of 2002, the production line of CMs was put into pilot operation. Even though the CMs production line operates continuously, the CTC distillation tower runs on a batch basis.

A. Internal Control System:

Wuxi Greenapple used a computerized accounting system.

Chlorine: It was produced internally. As they owned many production lines which used chlorine simultaneously, the company calculated the consumption amount for CMs production by applying a theoretical ratio. Hence, it was suggested that the chlorine consumption amount gave little clue to the real CMs production.

Methanol: Methanol was entered into financial system as one kind of supplementary material. Therefore, no beginning and ending inventories were shown in the financial records, as the financial records only gave the total balance for the group of supplementary materials, not for methanol. It was suggested that Wuxi Greenapple record methanol as one of raw materials in the next year verification.

Based on the documents provided, it was found that numbers under different accounts and documents were consistent.

B. Conclusion:

CTC: Since September 2003, 495.15 MT of CTC were produced until December 2003. With the beginning inventory of 0 MT, the sales of 443.01 MT and the self-use amount of 52.14 MT, Wuxi Greenapple held an ending inventory of 0 MT.

Chlorine: In 2003, Wuxi Greenapple consumed 8,915.443 MT of chlorine.

Methanol: In 2003, Wuxi Greenapple purchased 16,442.49 MT of methanol and sold 12,783.4 MT. With a beginning inventory of 0 MT and an ending inventory of 101.86 MT, Wuxi Greenapple consumed 3,557.23 MT of methanol.

CTC 15: Shangdong Jinling Group Company

In May 2002, the plant began its construction. The maximum production will be 2,000 MT of CTC. CTC ratio over CMs is 1.9 percent.

A. Internal Control:

Shandong Jinling used very popular accounting software to produce its financial records.

Chlorine: Produced internally by another subsidiary under the same parent company. The chlorine producer issued out of the warehouse documents to users. The financial department used the transfer amount as the actual chlorine consumption amount. Then, there was no inventory at both beginning and end of 2003.

Methanol: Purchase from outside. Except for that used for CMs production, Shangdong Jinling sold some methanol to the outside.

Several problems with the financial system were found in the verification:

The methanol purchase amount in November was wrong as the financial department staff explained that some mistakes happened in the summing procedure.

Inconsistence existed under accounts. Different amounts were found under the same account from different documents.

Even the estimated raw material purchase account was used in balancing the records from financial department and warehouse department. It was found that at the end of November, a negative inventory appeared on the financial records.

As the company gave several excuses to avoid showing its system to the verification team, it was determined that the verification team couldn't give any judgment on the reliability of the financial system.

B. Results:

Based on the limited documents, the verification team obtained the data below. However, the verification team could not verify the numbers as we had no opportunity to review the complete financial records and reports.

CTC production: In 2003, 147.737 MT of CTC were produced and 91.08 MT were sold. With a zero beginning inventory, Shandong Jinling held an inventory of 56.657 MT at the end of 2003.

Chlorine: In 2003, Shandong Jinling consumed 7,098.5 MT of chlorine.
(This amount was different from that from production verification. Shandong Jinling explained that it allocated part of chlorine consumed in CMs to other production line.)

Methanol: In 2003, Shandong Jinling purchased 4,334.32 MT of methanol and sold out 100 MT. As it consumed 4,099.14 MT of methanol in CTC consumption, Shandong Jinling held an inventory of 135.18 MT at the end of 2003.

(This amount was different from that from production verification. Shandong Jinling explained that it allocated part of other production line consumed amount to CMs production line.)

CM2: In 2003, 4204.85 MT of CM2 were produced by Shandong Jinling.
CM3: In 2003, 3238.09 MT of CM3 were produced by Shandong Jinling.

CTC F1: Juhua Lanxi Agrochemical Co., Ltd.

Lanxi is a CTC consumer which uses CTC to produce cinnamic acid, a non-ODS product.

From July 2002, the cinnamic acid production line was put into production. In 2003, the production line was getting into full operation. It was designed that the full capacity of the production line is 200 MT of cinnamic acid.

A. Internal Control System:

Zhejiang Lanxi used computerized accounting system to conduct its financial management. Physical inventory checking reports were sent to the financial department monthly. In October, annual checking on all of the main raw materials was conducted.

According to the financial department, it was estimated that nearly 1 MT cinnamic acid can be produced from 1.8 MT CTC.

Generally speaking, Zhejiang Lanxi's financial management was well-performed. Only a few problems existed in the accounting system:

a. There was a change made on the accounting records while no one could tell who made such change.

b. It was found that several original documents were placed improperly.

c. Costs were allocated based on the final products amount without any consideration of quality. Therefore, high quality and low quality products had the same unit costs.

Based on the documents provided by financial department, it was reasonable to conclude that Zhejiang Lanxi had a reliable accounting system on CTC production.

B. Conclusion:

From financial documents provided by Zhejiang Lanxi, the following information was verified:

In 2003, Zhejiang Lanxi produced 134.504 MT of cinnamic acid. With the beginning inventory of 9.15 MT and annual sales of 75.534 MT, Zhejiang Lanxi kept an inventory of 68.12 MT at the end of 2003.

CTC raw material: In 2003, 241.12 MT of CTC was consumed in the production of cinnamic acid. With the beginning inventory of 15 MT and the purchase of 233.62 MT from Zhejiang Quhua, Zhejiang Lanxi kept an ending inventory of 7.5 MT. The CTC purchase amounts were cross-checked with the financial documents of Zhejiang Quhua.

CTC F2: Yongkang Sanhaun Chemical Co., Ltd.

Zhejiang Sanhuan is a CTC consumer, which uses CTC as a feedstock to produce trifluoropropene.

From each 3.3 MT of CTC, 1 MT of trifluoropropene was produced while the theoretical ratio should be 1.67. Zhejiang Sanhuan explained that was due to many by-products produced in the same process.

A. Internal control:

Accounting records were produced by hand. As Sanhuan was unwilling to provide financial documents, no original documents except invoices from Longyuan were verified.

Based on the limited information, it was found that under the raw material accounts, there existed no sub-account to track the costs and location of each raw material.

Another problem was that there was no exact date on the accounting vouchers of when the accounting records were produced.

It was also found that some accounting records had no original documents attached. It might have resulted from the company's wanting to keep information confidential.

Because Zhejiang Sanhuan was reluctant to show its accounting system, the verification team could not give any comments on the reliability of the financial management system.

B. Conclusion:

From financial documents provided by Zhejiang Sanhuan, the following information was obtained:

In 2003, Zhejiang Sanhuan purchased 362.5 MT of CTC, of which 21 MT were obtained from Shanghai Huaheng and 341.5 MT from Longyuan Trading Company, which purchased 883 MT of CTC from Zhejiang Quhua in 2003.

CTC usage: In 2003, Zhejiang Sanhuan put 352.5 MT of CTC into the production line. With the beginning inventory of 0 MT, the ending inventory of CTC was 10 MT. (No original documents and daily account transactions were checked because Sanhuan did not provide the documents. At the same time, the inventory amount was calculated by the verification team, no support documents were provided.)

3,3,3-Trifluoropropene production and sales: In 2003, Zhejiang Sanhuan reported that it produced 108.66 MT of 3,3,3-Trifluoropropene. With a beginning inventory of 0 MT and the sales of 88.68 MT, Zhejiang Sanhuan kept 19.98 MT of inventory at the end of 2003. (No original documents and daily account transactions were checked because Sanhuan did not provide the documents. At the same time, the inventory amount was calculated by the verification team, no support documents were provided.)

CHINA PROCESS AGENT SECTOR PLAN

PHASE I

2003 Consumption of CTC and CFC-113 in PA Sector (Phase 1)

Verification Report

World Bank

May 2004

Introduction

As requested by the agreement between China and the Executive Committee of the Multilateral Fund for the Process Agent Sector Plan, Phase I, the annual production and consumption of CTC and consumption of CFC-113 must be verified independently by the World Bank. This report provides an update of the 2003 verification work covering the consumption of CTC and CFC-113.

World Bank has appointed an independent verification team for the consumption of CTC and CFC-113 verification. The verification team consisted of one technical expert and one operations officer to conduct the verification.

The World Bank mission visited 23 enterprises (Shanghai 3F has two plants) between April 3 and April 29,2004. The names of the 23 enterprises are as follow:

1. Shanghai Dihe Chemical Plant
2. Guangzhou Haotian Chemical (Group) Co. Ltd
3. Wuxi Greenapple Chemical Co. Ltd
4. Zhejiang Xin'an Chemical and Industrial Co. Ltd.
5. Jiangsu Fasten Fine Chemical Co. Ltd
6. Sinopec Zhongyou Chlorinated Rubber Plant
7. Shangyu Qiming Chemical Co. Ltd.
8. Huanghua Jinhua Chemical Co. Ltd.
9. Shenyang Chemical Co. Ltd.
10. Longchang Shouchang Chemical Co. Ltd.
11. Longchang Shenghua Chemical Plant
12. Longyou greenland Pesticides Co. Ltd.
13. Dalian JX Chemical-Industrial Co. Ltd.
14. Harbin Yibin Chemical Co. Ltd.
15. Jilin Chemical Industrial Co. Ltd
16. Jiangsu Anbang Group Corporation
17. Huahai Pharmaceutical Co. Ltd.
18. Shanghai 3F New Material Co. Ltd.
19. Chenguang Chemical Research Institute
20. Jiangsu Meilan Chemical Co. Ltd
21. Fuxin Fluoro-Chemical Co. Ltd.
22. Jinan 3F Fluoro-Chemical Co. Ltd.
23. Luzhou Hongyuan Chemcial Plant

Methodology of Verification

The World Bank mission took the following steps at each enterprise during verification of CTC and CFC-113 consumption:

- Listened to the enterprise management's introduction of enterprise and its production;
- Visited production line and took photos ;
- Visited warehouse of raw materials especially that of CTC/CFC-113 and took photos;
- Visited warehouse of final products and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final products and copied a set of sales receipt (VAT receipt) and packing record;
- Randomly pick one month production record and verify daily production.

Conclusion

The consumption of CTC and CFC-113 in 2003 was within the limits set by the agreement between The People Republic of China and the Executive Committee of the Multilateral Fund.

The consumption of CTC and CFC-113 are listed in the following table:

Table 1. Consumption of CTC and CFC-113 in 2003 **Unit: Ton**

	PA opening stock	PA closing stock	Purchase of PA	Consumption of PA
CTC Consumption				
Shanghai Dihe Chemical Plant	10.06	28	223.18	205.24
Haotian Chemical Co., Ltd. (CR2)	57.723	89.63	199.5	167.59
Wuxi Greenapple Chem Co Ltd (CR3)	4.75	0	128.14	132.89
Zheijiang Xin'an Chemical and Industrial Co., Ltd. (CR4)	37.077	37	220.5	220.577
Jiangyin Fasten Fine Chemical Co. Ltd. (CR5)	39.42	58.68	212.64	193.38
He-nan Puyang Oilfield CR Factory (CR6)				See next row
Sinopec Zhongyuan Chlorinated Rubber	9.27	9.27	0	0
Shangyu Qiming Chemical Co. Ltd. (CR7)	2.6944	0	0	0
Hebei Huanghua Jihua Chemical Co. Ltd. (CP1)	32.75	17.25	90	105.5
Zheijiang Xin'an Chemical and Industrial Co., Ltd. (CP2)				See CR4 above)
Jiangyin Fasten Fine Chemical Co. Ltd. (CP3)				See CR5 above
Shenyang Chemical Co. Ltd. (CP4)	35.81	20.19	44	59.62
Longchang Shouchang Chemical Co. Ltd. (CP5)	9.97	0.493	141	146
Longchang Shenghua Chemical Factory (CP6)	10.5	6.5	98.2	102.2
Chongqing Tianyuan Chemical general factory(CP7)				0 See note
Longyou greenland Pesticides Co. Ltd.(CP8)	0	0	0	0
Dalian Jiangxi Chem-Industrial Co. Ltd. (CP9)	5.035	-75.585	260.04	340.66
Harbin Yibin Chemical Co., Ltd.(CP10)	0.66	0.15	61.3	61.81
Jilin Chemical Industrial Co. Ltd. (CSR1).	82.607	404.02	1,338.27	1,016.857
Jiangsu Anbang Group Corporation (ES1)	0	6.59	165.14	37.4
Huahai Pharmaceutical Co., Ltd. (KET1)	10.348	4.2	6.0	10.676
Total CTC Consumption				**1,467.403**
CFC-113 Consumption				
Shanghai 3F New Material Co. Ltd. (Plant No. 2)(PTFE1a)	0	0	5.5	5.5
Shanghai 3F New Material Co. Ltd. (Fluoro Plant)(PTFE1b)	0	0	4.5	4.5
Chenguang Chemical Research Institute (PTFE2)	1.5	1.61	3.5	3.39
Jinan 3F Fluoro-Chemical Co. Ltd. (PTFE3)	0.5	0.5	5	5
Jiangsu Meilan Chemical Co. Ltd.(PTFE4)	0	0	0	0
Fuxin Fluoro-Chemical Co. Ltd. (PTFE5)	1.0	1.0	3.0	3.0
Total CFC-113 Consumption				**21.39**

Numbers in bracket refer to numbers in the 2004 AP.

Report on the 23 PA enterprises

Shanghai Dihe Chemical Plant

Enterprise Background

Shanghai Dihe Chemical Plant (Dihe) was established in 2002. The chlorinated rubber production line was installed in 1964 with annual capacity of 500 tons.

Name of the director and his contact information are as follow:

Yongchun Guo
Director of Production Department
Telephone: 021-6434-3296
Fax: 021-6434-1723
Address: 4800 Longwu Road, Shanghai 200241, China

Verification

The World Bank mission has taken the following verification steps at Dihe:

- Listened to Mr. Guo's introduction of Dihe and its production of chlorinated rubber;
- Visited production line of chlorinated rubber and took photos (Photos are provided in separated files (Folder: Dihe-Photos));
- Visited warehouse of raw materials especially that of CTC and took photos;
- Visited warehouse of chlorinated rubber and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final product (chlorinated rubber) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated rubber are documented in separated file (File: Dihe-Financial Records).

Conclusion

- Dihe has good financial records;

- 2003 opening stock of CTC is 10.06 tons. Closing stock of CTC is 28 ton. Procurement of CTC is 223.18 tons. Consumption of CTC is 205.24 tons;

- 2003 beginning inventory of chlorinated rubber is 43.69 tons. Ending inventory of chlorinated rubber is 58.02 tons. Production of chlorinated rubber is 423 tons. Sale of chlorinated rubber is 408.67 tons;

- The mission did not find any discrepancies of CTC or chlorinated rubber data.

CR2: Guangzhou Haotian Chemical (Group) Co. Ltd.

Enterprise Background

Guangzhou Haotian Chemical (Group) Co. Ltd. (Guangzhou) was established in 1956. Chlorinated rubber production line was constructed and completed in 1979 with annual capacity of 100 tons. After its expansion in 1990, the line reached the annual capacity of 500 tons.

Name of the director and his contact information are as follow:

Fan Li
General Manager
Telephone: 020- 85525216
Fax: 020- 85534897
Address: 368 Huangpu Road, Tianhe District, Guangzhou 510655, China

Verification

The World Bank mission has taken the following verification steps at Guangzhou:

- Listened to Mr. Li's introduction of Guangzhou and its production of chlorinated paraffin;

- Visited production line of chlorinated rubber and took photos (Photos are provided in separated files (Folder: Guangzhou-Photos));

- Visited warehouse of raw materials especially that of CTC and took photos;

- Visited warehouse of chlorinated rubber and took photos;

- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;

- Checked financial records (2003) of final product (chlorinated rubber) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated rubber are documented in separated file (File: Guangzhou-Financial Records).

Conclusion

- Guangzhou has good financial records;
- 2003 opening stock of CTC is 57.723 tons. Closing stock of CTC is 89.63 tons. Procurement of CTC is 199.5 tons. Consumption of CTC is 167.59 tons;
- 2003 beginning inventory of chlorinated rubber is 24.88 tons. Ending inventory of chlorinated rubber is 65.72 tons. Production of chlorinated rubber is 189.5 tons. Sale of chlorinated rubber is 148.7 tons;
- The mission did not find any discrepancies of CTC or chlorinated paraffin data.

CR3: Wuxi Greenapple Chemical Co. Ltd.

Enterprise Background

The chlorinated rubber production line at Wuxi Greenapple was installed in 1994. The annual capacity of the line is around 1,000 tons. Wuxi Greenapple has signed agreement with State Environmental Protection Administration to close its chlorinated rubber line. Wuxi plan to close the line by November 2004.

Name of the director and his contact information are as follow:

Litao Guo
Deputy Manager of Technology Department
Telephone: 0510-310-1601
Fax: 0510-310-1678
Address: 274 Xicheng Rd, Wuxi, Jiangsu 214041, China

Verification

The World Bank mission has taken the following verification steps at Wuxi:

- Listened to Mr. Guo's introduction of Wuxi and its production of chlorinated rubber;
- Visited production line of chlorinated rubber and took photos (Photos are provided in separated files (Folder: Wuxi-Photos));
- Visited warehouse of raw materials especially that of CTC and took photos;
- Visited warehouse of chlorinated rubber and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final product (chlorinated rubber) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated rubber are documented in separated file (File: Wuxi-Financial Records).

Conclusion

- Wuxi has good financial records;
- 2003 opening stock of CTC is 4.75 tons. Closing stock of CTC is 0 ton. Procurement of CTC is 128.14 tons. Consumption of CTC is 132.89 tons;
- 2003 beginning inventory of chlorinated rubber is 25.49 tons. Ending inventory of chlorinated rubber is 51.48 tons. Production of chlorinated rubber is 265.2 tons. Sale of chlorinated rubber is 239.21 tons;
- The mission did not find any discrepancies of CTC or chlorinated rubber data.

CR4: Zhejiang Xin'an Chemical Industrial Group Co. Ltd.
Same company as CP2

Enterprise Background

Zhejiang Xin'an Chemical Industrial Group Co. Ltd. (Xin'an) was established in 1991. Xin'an has one chlorinated rubber production line and one chlorinated paraffin-70 production line.

Name of the director and his contact information are as follow:

Qunxiao Wang
Manager
Telephone: 0571-64734354
Fax: 0571-64721344
Address: 93 Beisha Road, Jiande, Zhejiang 311600, China

Verification

The World Bank mission has taken the following verification steps at Xin'an:

- Listened to Mr. Wang's introduction of Xin'an and its production of chlorinated rubber and chlorinated paraffin-70;
- Visited production line of chlorinated rubber and took photos (Photos are provided in separated files (Folder: Xin'an-Photos));
- Visited production line of chlorinated paraffin-70 and took photos;
- Visited warehouse of raw materials especially that of CTC and took photos;

- Visited warehouse of chlorinated rubber and chlorinated paraffin-70 and took photos;

- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;

- Checked financial records (2003) of final product (chlorinated rubber and chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated rubber are documented in separated file (File: Xin'an-Financial Records).

Conclusion

- Xin'an has good financial records;

- 2003 opening stock of CTC is 37.077 tons. Closing stock of CTC is 37.410 ton. Procurement of CTC is 220.5 tons. Consumption of CTC is 220.577 tons, among that 2.333 tons of CTC has delayed invoice;

- 2003 beginning inventory of chlorinated rubber is 6.397 tons. Ending inventory of chlorinated rubber is 55.526 tons. Production of chlorinated rubber is 464.7 tons. Sale of chlorinated rubber is 415.571 tons;

- 2003 beginning inventory of chlorinated paraffin-70 is 82.523 tons. Ending inventory of chlorinated paraffin-70 is 28.919 tons. Production of chlorinated paraffin-70 is 554.5tons. Sale of chlorinated paraffin is 608.104 tons;

- The mission did not find any data discrepancies of CTC, chlorinated rubber and chlorinated paraffin-70.

CR5: Jiangsu Fasten Fine Chemical Co. Ltd.
Same company as CP3

Enterprise Background

Jiangsu Fasten Fine Chemical Co. Ltd. (Fasten) was established in 1999. The corporation has one chlorinated rubber production line and one chlorinated paraffin-70 production line. The chlorinated paraffin-70 production line was dismantled in November 2001. Fasten has established a new chlorinated paraffin-70 production line using water solution technology instead of CTC technology. The mission visited new chlorinated paraffin-70 line, site of old chlorinated paraffin line, and chlorinated rubber line. CTC is still used in production of chlorinated rubber as process agent.

Name of the director and his contact information are as follow:

Kezhi Yao
General Manager
Telephone: 0510-611-4392

Fax: 0510-611-4383
Address: 987 Naiwaihuan Lu, Jiangyi, Jiangsu 214433, China

Verification

The World Bank mission has taken the following verification steps at Fasten:

- Listened to Mr. Yao's introduction of Fasten and its production of chlorinated paraffin and chlorinated rubber;
- Visited production line of chlorinated paraffin-70 (new) and took photos (Photos are provided in separated files (Folder: Fasten-Photos));
- Visited site of dismantled chlorinated paraffin-70 line (using CTC) and took photos;
- Visited production line of chlorinated rubber and took photos;
- Visited warehouse of raw materials especially that of CTC and took photos;
- Visited warehouse of chlorinated paraffin-70 and took photos;
- Visited warehouse of chlorinated rubber and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final product (chlorinated rubber) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated rubber are documented in separated file (File: Fasten-Financial Records).

Conclusion

- Fasten has good financial records;
- Fasten has dismantle old chlorinated paraffin-70 line that used CTC;
- Fasten has established a new chlorinated paraffin-70 line using water technology;
- Fasten still uses CTC in its chlorinate rubber production;
- 2003 opening stock of CTC is 39.42 tons. Closing stock of CTC is 58.68 tons. Procurement of CTC is 212.64 tons. Consumption of CTC is 193.38 tons;
- 2003 beginning inventory of chlorinated rubber is 26.07 tons. Ending inventory of chlorinated rubber is 156.40 tons. Production of chlorinated rubber is 703.49 tons. Sale of chlorinated rubber is 573.13 tons;
- The mission did not find any discrepancies of CTC or chlorinated rubber data.

CR6: He-nan Puyang Oilfield CR Factory
(Sinopec Chlorinated Rubber Plant)

Enterprise Background

Sinopec Zhongyuan Chlorinated Rubber Plant (Puyang) installed its chlorinated rubber production line in 1997 with annual capacity of 500 tons. Puyang dismantled this chlorinated rubber line in January 2004 and did not produce any chlorinated rubber since October 2002.

Name of the director and his contact information are as follow:

Linhe Zhang
Senior Accountant
Telephone: 0393-4821885
Fax: 0393-4892116
Address: Wuyi Road, Puyang, Henan 457001, China

Verification

The World Bank mission has taken the following verification steps at Puyang:

- Listened to Mr. Zhang's introduction of Puyang and disposal of chlorinated rubber production line;
- Visited site of original production line of chlorinated rubber and took photos (Photos are provided in separated files (Folder: Puyang-Photos));
- Visited warehouse of chlorinated rubber and checked the stock of chlorinated rubber;
- Checked financial records (2001-2003) of raw materials (CTC);
- Checked financial records (2001-2003) of final product (chlorinated rubber) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated rubber are documented in separated file (File: Puyang-Financial Records).

Conclusion

- Puyang has good financial records;
- Puyang has dismantled its chlorinated rubber production line;
- Puyang used CTC and produced chlorinated rubber in 2001 and 2002 but did not produce chlorinated rubber in 2003;

- 2003 opening stock of CTC is 9.27 tons. Closing stock of CTC is 9.27 ton. Procurement of CTC is 0 ton. Consumption of CTC is 0 ton;

- 2003 beginning inventory of chlorinated rubber is 0 ton. Ending inventory of chlorinated rubber is 0 ton. Production of chlorinated rubber is 0 ton. Sale of chlorinated rubber is 0 ton;

- Five employees originally worked in chlorinated rubber production were laid off and compensated with RMB 18,000;

- The mission did not find any discrepancies of CTC or chlorinated rubber data.

CR7: Shangyu Qiming Chemical Co. Ltd.

Enterprise Background

Shangyu Qiming Chemical Co. Ltd. (Qiming) was established in 1995. Chlorinated rubber production line was installed in 1996 with annual capacity of 500 tons. Qiming dismantled this chlorinated rubber line in January 2004 and did not produce any chlorinated rubber since January 2003.

Name of the director and his contact information are as follow:

Qiming Zhang
Director
Telephone: 0575-2735222
Fax: 0575-2731398
Address: Fine Chemical Zone, Shangyu, Zhejiang 312369, China

Verification

The World Bank mission has taken the following verification steps at Qiming:

- Listened to Mr. Zhang's introduction of Qiming and disposal of chlorinated rubber production line;

- Visited site of original production line of chlorinated rubber and took photos (Photos are provided in separated files (Folder: Qiming-Photos));

- Visited warehouse of chlorinated rubber and checked the stock of chlorinated rubber;

- Checked financial records (2001-2003) of raw materials (CTC);

- Checked financial records (2001-2003) of final product (chlorinated rubber) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated rubber are documented in separated file (File: Qiming-Financial Records).

Conclusion

- Qiming has good financial records;
- Qiming has dismantled its chlorinated rubber production line;
- Qiming used CTC and produced chlorinated rubber in 2001 and 2002 but did not produce chlorinated rubber in 2003;
- 2003 opening stock of CTC is 2.6944 tons. Closing stock of CTC is 0 ton. Procurement of CTC is 0 ton. According to Qiming, 2.6944 tons of CTC was used for pharmaceutical production;
- 2003 beginning inventory of chlorinated rubber is 32.5 tons. Ending inventory of chlorinated rubber is 1.5 tons. Production of chlorinated rubber is 0 ton. Sale of chlorinated rubber is 31 tons;
- All 24 employees originally worked in chlorinated rubber production were transferred to other positions in Qiming. There was no unemployment caused by dismantling of chlorinated rubber production line;
- The mission did not find any discrepancies of CTC or chlorinated rubber data.

CHLORINATED PARAFFIN 70 PRODUCTION

CP1: Hebei Huanghua Jinhua Chemical Co. Ltd.

Enterprise Background

Hebei Huanghua Jinhua Chemical Co. Ltd. (Huanghua) was established in 1999. Before 1999, all production facilities belonged to Hebei Huanghua Chemical Plant. Chlorinated paraffin-70 production line was constructed and completed in 1991. After its expansion in 1998, the line reached the annual capacity of 3,000 tons.

Name of the director and his contact information are as follow:

Lianqing Zhang
Telephone: 0317-522-3370
Fax: 0317-522-3370
Address: Neibeihuan Rd. Huanghua, Hebei,, P.R.China, 061100

Verification

The World Bank mission has taken the following verification steps at Huanghua:

- Listened to Mr. Zhang's introduction of Huanghua and its production of chlorinated paraffin;

- Visited production line of chlorinated paraffin-70 and took photos (Photos are provided in separated files (Folder: Huanghua-Photos));

- Visited warehouse of raw materials especially that of CTC and took photos;

- Visited warehouse of chlorinated paraffin-70 and took photos;

- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;

- Checked financial records (2003) of final product (chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are documented in separated file (File: Huanghua-Financial Records).

Conclusion

- Huanghua has good financial records;

- 2003 opening stock of CTC is 32.75 tons. Closing stock of CTC is 17.25 tons. Procurement of CTC is 90 tons. Consumption of CTC is 105.5 tons;

- 2003 beginning inventory of chlorinated paraffin-70 is 82 tons. Ending inventory of chlorinated paraffin-70 is 254.10 tons. Production of chlorinated paraffin-70 is 546.3 tons. Sale of chlorinated paraffin is 374.2 tons;

- The mission did not find any discrepancies of CTC or chlorinated paraffin data.

CP2: Zhejiang Xin'an Chemical Industrial Group Co. Ltd
Same as CR4

CP3: Jiangsu Fasten Fine Chemical
Same as CR5

CP4: Shenyang Chemical Co. Ltd.

Enterprise Background

Shenyang Chemical Co. Ltd. (former Shenyang Chemical Plant) was established in 1938. It was changed Sharing holding corporation in 1997. Chlorinated paraffin-70 production line was constructed and completed in 1983 with annual capacity of 1,500 tons. Operation days of chlorinated paraffin in 2003 was 148.

Name of the director and his contact information are as follow:

Zhihong Gu
Telephone: 024-25553221
Fax: 024-25827733
Address: No. 46, Weigongjie, Tiexie District, Shenyang, PR.China, 110026

Verification

The World Bank mission has taken the following verification steps at Shenyang:

- Listened to Gu's introduction of Shenyang and its production of chlorinated paraffin;
- Visited production line of chlorinated paraffin-70 and took photos (Photos are provided in separated files (Folder: Shenyang-Photos));
- Visited warehouse of raw materials especially that of CTC and took photos;
- Visited warehouse of chlorinated paraffin-70 and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final product (chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are provided in separated file (File: Shenyang-Financial Records).

Conclusion

- Shenyang has good financial records;
- 2003 opening stock of CTC is 35.81 tons. Closing stock of CTC is 20.19 tons. Procurement of CTC is 44 tons. Consumption of CTC is 59.62 tons;
- 2003 beginning inventory of chlorinated paraffin-70 is 134 tons. Ending inventory of chlorinated paraffin-70 is 246 tons. Production of chlorinated paraffin-70 is 683 tons. Sale of chlorinated paraffin is 571 tons;
- The mission did not find any discrepancies of CTC or chlorinated paraffin data.

CP5: Longchang Shouchang Chemical Co. Ltd.

Enterprise Background

Longchang Shouchang Chemical Co. Ltd. was established in 1995. Chlorinated paraffin-70 production line was constructed and completed in 1995 with annual capacity of 1,000 tons.

Name of the director and his contact information are as follow:

Shaochang Tang
Director
Telephone: 0832-362-3078
Fax: 0832-362-6079
Address: Fujiaqiao Longchang County, Sichuan 642171, China

Verification

The World Bank mission has taken the following verification steps at Shouchang:

- Listened to Mr. Tang's introduction of Shouchang and its dismantling of chlorinated paraffin-70 production line;
- Visited former workshop of chlorinated paraffin-70 production and took photos. (Photos are provided in separated file (Folder: Shouchang-Photos));
- Visited warehouse of chlorinated paraffin-70 and took photos;
- Checked financial records (2003) of raw materials and copied receipts of CTC purchased in 2003;
- Checked financial records (2003) of final product (chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are attached in separated file (File:Shouchang-Financial records).

Conclusion

- Shouchang had dismantled its chlorinated paraffin-70 production line before the mission visited the plant (February 2004);
- 2003 opening stock of CTC is 9.97 tons. Closing stock of CTC is 0.493 tons. Procurement of CTC is 141 tons. Consumption of CTC is 146 tons. 4.77 tons of CTC was sold to Longchang Shenghua;
- 2003 beginning inventory of chlorinated paraffin-70 is 23.57 tons. Ending inventory of chlorinated paraffin-70 is 83.57 tons. Production of chlorinated paraffin-70 is 560 tons. Sale of chlorinated paraffin is 500 tons;
- Shouchang did not provide VAT receipts of CTC procurement in 2003.

CP6: Longchang Shenghua Chemical Plant

Enterprise Background

Longchang Shenghua Chemical Plant (Shenghua) was established in 1995. Chlorinated paraffin-70 production line was constructed and completed in 1995 with annual capacity of 1,000 tons.

Name of the director and his contact information are as follow:

Yungao Wu
Director
Telephone: 0832-389-7020
Fax: 0832-389-7028
Address: Baishuitan County, Longchang 642165, China

Verification

The World Bank mission has taken the following verification steps at Shenghua:

- Listened to Mr. Wu's introduction of Shenghua and its production of chlorinated paraffin;
- Visited production line of chlorinated paraffin-70 and took photos. (Photos are provided in separated file (Folder: Shenghua-Photos));
- Visited warehouse of raw materials especially that of CTC and took photos;
- Visited warehouse of chlorinated paraffin-70 and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of CTC purchased in 2003;
- Checked financial records (2003) of final product (chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are attached in separated file (File:shenghua-Financial records).

Conclusion

- 2003 opening stock of CTC is 10.5 tons. Closing stock of CTC is 6.5 tons. Procurement of CTC is 98.2 tons. Consumption of CTC is 102.2 tons;
- 2003 beginning inventory of chlorinated paraffin-70 is 0 tons. Ending inventory of chlorinated paraffin-70 is 0 tons. Production of chlorinated paraffin-70 is 788 tons. Sale of chlorinated paraffin is 788 tons;
- Shenghua provided some VAT receipts of CTC procurement in 2003.

CP8: Longyou Greenland Pesticides Co. Ltd.

Enterprise Background

Longyou Greenland Pesticides Co. Ltd. (Longyou) was established 1997. Longyou mainly produces herbicide, pesticide and pesticide intermediates.

The CP-70 unit was installed in 1987 with annual capacity of 300 tons. Longyou stopped chlorinated paraffin-70 production in January 2002 and dismantled the production line in October 2002. Longyou has not produced any chlorinated paraffin since then.

Name of the director and his contact information are as follow:

Yao Xu
Manager
Telephone: 0570-7855741
Fax: 0570-7855806
Address: 50 Baota Road, Longyou, Zhejiang 324400, China

Verification

The World Bank mission has taken the following verification steps at Longyou:

- Listened to Mr. Xu's introduction of Longyou and disposal of chlorinated paraffin-70 production line;
- Visited site of original production line of chlorinated paraffin-70 and took photos (Photos are provided in separated files (Folder: Longyou-Photos));
- Checked financial records (2001-2003) of raw materials (CTC);
- Checked financial records (2001-2003) of final product (chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are documented in separated file (File: Longyou-Financial Records).

Conclusion

- Longyou has good financial records;
- Longyou has dismantled its chlorinated paraffin-70 production line;
- Longyou used CTC and produced chlorinated paraffin in 2001but did not produce chlorinated paraffin since then;

- 2003 opening stock of CTC is 0 ton. Closing stock of CTC is 0 ton. Procurement of CTC is 0 ton. Consumption of CTC is 0 ton;

- 22 employees originally worked in chlorinated paraffin production were affected by the closure. According to Longyou, they have got 307,600 RMB as compensation;

- The mission did not find any discrepancies of CTC or chlorinated paraffin-70 data.

CP9: Dalian JX Chem-Industrial Co. Ltd.

Enterprise Background

Dalian JX Chem-Industrial Co. Ltd. (Dalian) was established in 1980. Chlorinated paraffin-70 production line was constructed in 1986 with annual capacity of 500 tons. After its expansion in 1998, the line reached the annual capacity of 3,000 tons. 70% of Dalian's chlorinated paraffin-70 is exported.

Name of the director and his contact information are as follow:

Wang Taifeng
Telephone: 0411-622-0231
Fax: 0411-622-0306
Address: Jiangxi County, Dalian 116046, China

Verification

The World Bank mission has taken the following verification steps at Dalian:

- Listened to Mr. Wang's introduction of Dalian and its production of chlorinated paraffin;

- Visited production line of chlorinated paraffin-70 and took photos (Photos are provided in separated files (Folder: Dalian-Photos)) ;

- Visited warehouse of raw materials especially that of CTC and took photos;

- Visited warehouse of chlorinated paraffin-70 and took photos;

- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;

- Checked financial records (2003) of final product (chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are provided in separated file (File: Dalian-Financial Records).

Conclusion

- Dalian has good financial records;
- 2003 opening stock of CTC is 5.035 tons. Closing stock of CTC is -75.585 tons. Procurement of CTC is 260.04 tons. Consumption of CTC is 340.66 tons;
- 2003 beginning inventory of chlorinated paraffin-70 is 279.67 tons. Ending inventory of chlorinated paraffin-70 is 112.13 tons. Production of chlorinated paraffin-70 is 2,149.21 tons. Sale of chlorinated paraffin is 2,316.76 tons;
- The mission did not find any discrepancies of CTC or chlorinated paraffin data.

CP10: Harbin Yibin Chemical Co. Ltd.

Enterprise Background

Harbin Yibin Chemical Co. Ltd. (Yibin) was established in 1989. Chlorinated paraffin-70 production line was constructed and completed in 1996 with annual capacity of 1,000 tons. When the World Bank mission visited Yibin, the enterprise already dismantled its chlorinated paraffin-70 line January 2004.

Name of the director and his contact information are as follow:

Bojun Xing
Manager
Telephone: 0451-5510-3525
Fax: 0451-5512-3185
Address: 103 Huagong Road, Harbin, China

Verification

The World Bank mission has taken the following verification steps at Yibin:

- Listened to Mr. Xing's introduction of Yibin, its production of chlorinated paraffin and its dismantling of chlorinated paraffin-70 line;
- Visited production line of chlorinated paraffin-65 and took photos (Photos are provided in separated files (Folder: Yibin-Photos));
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final product (chlorinated paraffin-70) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are provided in separated file (File:Yibin-Financial Records).

Conclusion

- 2003 opening stock of CTC is 0.66 tons. Closing stock of CTC is 0.15 tons. Procurement of CTC is 61.3 tons. Consumption of CTC is 61.81 tons;

- 2003 beginning inventory of chlorinated paraffin-70 is 180.351 tons. Ending inventory of chlorinated paraffin-70 is 17.8 tons. Production of chlorinated paraffin-70 is 1,035tons. Sale of chlorinated paraffin is 1,197 tons;

- Yibin did not provide VAT receipts of CTC procurement in 2003.

CPXX: Luzhou Hongyuan Chemcial Plant

The World Bank visited Luzhou Hongyuan Chemical Plant on April 18. The plant was not in production of any products. According to Hongyuan, the plant was established in 1995 and its chlorinated paraffin-70 line was also installed in 1995.

The mission has requested Hongyuan to provide governmental approval, social and environmental impact assessment for its construction of its chlorinated paraffin line. According to Hongyuan, the plant does not have such document. Hongyuan did not provide accounting record either.

Based on what was observed, the mission concluded that it is difficult to judge whether Hongyuan ever built a chlorinated paraffin line and how much chlorinated paraffin was produced.

CSM PRODUCTION

CSR1: Jilin Chemical Industrial Co. Ltd.

Enterprise Background

Jilin Chemical Industrial Co. Ltd. (Jilin) was established in 1957. The first CSM production line was constructed and completed in 1968 with annual capacity of 1,000 tons. The second CSM production line was constructed and completed in 1989 with annual capacity of 2,000 tons.

The World Bank mission was not allowed to take photos in both CSM production workshops.

Name of the director and his contact information are as follow:

Guangri Jin
Deputy Director
Telephone: 0432-3986149
Fax: 0432-3983957
Address: No. 11 Zhengzhou Rd, Jilin, PR.China, 132022

Verification

The World Bank mission has taken the following verification steps at Jilin:

- Listened to Mr. Jin's introduction of Jilin and its CSM production;
- Visited both production lines of CSM;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final product (CSM) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and chlorinated paraffin-70 are provided in separated file (File:Jilin-Financial Records).

Conclusion

- Jilin has good financial records;
- 2003 opening stock of CTC is 82.607 tons. Closing stock of CTC is 404.02 tons. Procurement of CTC is 1,338.27 tons. Consumption of CTC is 1,016.857 tons;
- 2003 beginning CSM inventory is 411 tons. Ending CSM inventory is 293 tons. Production of CSM is 2,774 tons. Sale of chlorinated paraffin is 2,892 tons;
- The mission did not find any discrepancies of CTC and CSM data.

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KETOTIFEN PRODUCTION

KET1: Zhejiang Huahai Pharmaceutical Co. Ltd.

Enterprise Background

Zhejiang Huahai Pharmaceutical Co. Ltd. (Huahai) was established in 2001. The ketotifen production line was installed in 1991 with annual capacity of 3 tons. Huahai stopped using CTC in July 2003.

Name of the director and his contact information are as follow:

Baohua Chen
Chairman
Telephone: 0576-501600
Fax: 0576-5016028
Address: Xunqaio, Linhai, Zhejiang 317024, China

Verification

The World Bank mission has taken the following verification steps at Huahai:

- Listened to Mr. Chen's introduction of Huahai and its production of ketotifen;
- Visited production line of ketotifen and took photos (Photos are provided in separated files (Folder: Huahai-Photos));
- Visited warehouse of raw materials especially that of CTC and took photos;
- Visited warehouse of ketotifen and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of final product (ketotifen) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and ketotifen are documented in separated file (File: Huahai-Financial Records).

Conclusion

- Huahai has good financial records;
- 2003 opening stock of CTC is 10.348 tons. Closing stock of CTC is 4.2 ton. Procurement of CTC is 6.0 tons. Consumption of CTC is 10.676 tons. 1.472 tons of CTC was sold to other enterprise;
- 2003 beginning inventory of ketotifen is 0.225 tons. Ending inventory of ketotifen is 0.295 tons. Production of ketotifen is 1.4009 tons. Sale of ketotifen is 1.3309 tons;
- The mission did not find any discrepancies of CTC or ketotifen data.

ENDOSULFAN PRODUCTION

ES1: Jiangsu Anbang Group Corporation

Enterprise Background

Jiangsu Anbang Group Corporation (Anbang) was established in 1958. Endosulphan production line was installed in 1997 with annual capacity of 400 tons. A new endosulphan line was installed in 2000 with annual capacity of 1,000 tons. This endosulphan line was stop in July 2003. Some equipment from the production line was dismantled.

Name of the director and his contact information are as follow:

Yue Liu
President
Telephone: 0517-3556119
Fax: 0517-3631984
Address: 30 Huagong Rd, Huai'an, Jiangsu 223002, China

Verification

The World Bank mission has taken the following verification steps at Anbang:

- Listened to Mr. Wang Haiyang's introduction of Anbang, Anbang's production of endosulphan, and dismantle of endosulphan production line;
- Visited production line of endosulphan and took photos (Photos are provided in separated files (Folder: Anbang-Photos));
- Visited warehouse of raw materials especially that of CTC and took photos;
- Visited warehouse of endosulphan and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CTC purchased in 2003;
- Checked financial records (2003) of endosulphan and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CTC and endosulphan are documented in separated file (File: Anbang-Financial Records).

Conclusion

- Anbang has good financial records;
- 2003 opening stock of CTC is 0 ton. Closing stock of CTC is 6.59 tons. Procurement of CTC is 165.14 tons. Total Consumption of CTC at Anbang is 158.55 tons. The consumption for endosulphan is 37.4 tons. The mission requested Anbang to provide additional information to support such breakdown;
- 2003 beginning inventory of endosulphan is 92.122 tons. Ending inventory of endosulphan is 160.526 tons. Production of endosulphan is 422.84 tons. Sale of endosulphan is 354.4 tons;
- The mission did not find any discrepancies of CTC or endosulphan data.

PTFE PRODUCTION

PTFE1: Shanghai 3F New Material Co. Ltd.

Enterprise Background

Shanghai 3F New Material Co. Ltd. (Shanghai 3F) was established in 1992. Shanghai 3F has two PTFE plants. One is Plant No. 2, the other is Shanghai Fluoro-Chemical Plant (Shanghai Fluoro). CFC-113 is used as a process agent in manufacture of PTFE for recovering tetrafluoroethylene (TFE).

Name of the director and his contact information are as follow:

Jie Tang
Assistant to Manager
Telephone: 021-6434-0154
Fax: 021-6434-4702
Address: 4411 Long Wu Road, Shanghai 200241, China

Verification

The World Bank mission has taken the following verification steps at Shanghai 3F:

- Listened to Mr. Tang's introduction of Shanghai 3F and its production of PTFE;
- Visited production line of PTFE and took photos (Photos are provided in separated files (Folder: Shanghai 3F-Photos));
- Visited warehouse of raw materials especially that of CFC-113 and took photos;
- Visited warehouse of PTFE and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CFC-113 purchased in 2003;
- Checked financial records (2003) of final product (PTFE) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CFC-113 and PTFE are provided in separated file (Shanghai 3F-Financial Records).

Conclusion

- Shanghai 3F has good financial records;
- For Plant No. 2, 2003 opening stock of CFC-113 is 0 ton. Closing stock of CFC-113 is 0 ton. Procurement of CFC-113 is 5.5 tons. Consumption of CFC-113 is 5.5 tons;

- For Plant No. 2, 2003 beginning inventory of PTFE is 7.514 tons. Ending inventory of PTFE is 8.046 tons. Production of PTFE is 1,558.070 tons. Sale of PTFE is 1,557.538 tons;

- For Shanghai Fluoro, 2003 opening stock of CFC-113 is 0 ton. Closing stock of CFC-113 is 0 ton. Procurement of CFC-113 is 4.5 tons. Consumption of CFC-113 is 4.5 tons;

- For Shanghai Fluoro, 2003 beginning inventory of PTFE is 3.969 tons. Ending inventory of PTFE is 2.451 tons. Production of PTFE is 1,643.951 tons. Sale of PTFE is 1,645.469 tons;

- The mission did not find any discrepancies of CFC-113 or PTFE data.

PTFE2: Chenguang Chemical Research Institute

Enterprise Background

Chenguang Chemical Research Institute (Chenguang) was established in 1965. Chenguang has one PTFE production line which was installed in 1970s. After its expansion in 2002, the annual capacity reached to 3000 tons. CFC-113 is used as a process agent in manufacture of PTFE for recovering tetrafluoroethylene (TFE).

Name of the director and his contact information are as follow:

Zimin Zeng
Chief Engineer
Telephone: 0813-7202-180
Fax: 0813-7201-124
Address: Fushun County, Zigong, Sichuang 643201, China

Verification

The World Bank mission has taken the following verification steps at Chenguang:

- Listened to Mr. Zeng's introduction of Chenguang and its production of PTFE;

- Visited production line of PTFE and took photos (Photos are provided in separated files (Folder: Chenguang Photos));

- Visited warehouse of raw materials especially that of CFC-113 and took photos;

- Visited warehouse of PTFE and took photos;

- Checked financial records (2003) of raw materials and copied VAT receipts of all CFC-113 purchased in 2003;

- Checked financial records (2003) of final product (PTFE) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CFC-113 and PTFE are provided in separated file (File:Chenguang-Financial Records).

Conclusion

- Chenguang has good financial records;
- 2003 opening stock of CFC-113 is 1.5 tons. Closing stock of CFC-113 is 1.61 tons. Procurement of CFC-113 is 3.5 tons. Consumption of CFC-113 is 3.39 tons;
- 2003 beginning inventory of PTFE is 46 tons. Ending inventory of PTFE is 384 tons. Production of PTFE is 3,389 tons. Sale of PTFE is 3,051 tons;
- The mission did not find any discrepancies of CFC-113 or PTFE data.

PTFE3: Jinan 3F Fluoro-Chemical Co. Ltd.

Enterprise Background

Jinan 3F Fluoro-Chemical Co. Ltd. (Jinan 3F) was established in 1914. It was former Jinan Chemical Plant. Jinan 3F has one PTFE production line with annual capacity of 2,800 tons. CFC-113 is used as a process agent in manufacture of PTFE for recovering tetrafluoroethylene (TFE). The process is a continuous production and the number of operation days in 2003 is 307.

Name of the director and his contact information are as follow:

Jiyang Li
Manager
Telephone: 0531-595-2201
Fax: 0531-595-1373
Address: 130 Jiluo Road, Jinan, Shangdong 250031, China

Verification

The World Bank mission has taken the following verification steps at Jinan 3F:

- Listened to Mr. Li's introduction of Jinan 3F and its production of PTFE;
- Visited production line of PTFE and took photos (Photos are provided in separated files (Folder: Jinan 3F-Photos));
- Visited warehouse of raw materials especially that of CFC-113 and took photos;

- Visited warehouse of PTFE and took photos;

- Checked financial records (2003) of raw materials and copied VAT receipts of all CFC-113 purchased in 2003;

- Checked financial records (2003) of final product (PTFE) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CFC-113 and chlorinated PTFE are documented in separated file (File: Jinan 3F-Financial Records).

Conclusion

- Jinan 3F has good financial records;

- 2003 opening stock of CFC-113 is 0.5 tons. Closing stock of CFC-113 is 0.5 tons. Procurement of CFC-113 is 5 tons. Consumption of CFC-113 is 5 tons;

- 2003 beginning inventory of PTFE is 114.35 tons. Ending inventory of PTFE is 76.86 tons. Production of PTFE is 2,270.12 tons. Sale of PTFE is 2,307.62 tons;

- The mission did not find any discrepancies of CFC-113 or PTFE data.

PTFE4: Jiangsu Meilan Chemical Co. Ltd.

Enterprise Background

Jiangsu Meilan Chemical Co. Ltd. (Meilan) was established in 1996. PTFE Production line has annual capacity of 5,000 tons. Meilan stopped using CFC-113 in late 2002. According to Meilan, the process agent used in current PTFE production does not have ODP. Though Meilan did not disclose what type of substitute technology used in PTFE production.

Name of the director and his contact information are as follow:

Shunlin Jing
Vice President
Telephone: 0523-655-2276
Fax: 0523-655-2323
Address: 460 Yangzhou Rd. Taizhou, Jiangsu 225300, China

Verification

The World Bank mission has taken the following verification steps at Meilan:

- Listened to Mr. Jing's introduction of Meilan;

- Checked financial records (2003) of final product (PTFE) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of PTFE are provided in separated file (File:Meilan-Financial Records).

Conclusion

- The mission was not given any explanation of detail process of Meilan's PTFE production line because Meilan claimed that the process agent technology was confidential;
- The mission took photos of PTFE workshop from outside with Meilan's permission;
- 2003 beginning inventory of PTFE is 100.43 tons. Ending inventory of PTFE is -57.98 tons. Production of PTFE is 2,267.72 tons. Sale of PTFE is 2,426.13 tons;

PTFE5: Fuxin Fluoro-Chemical Co. Ltd.

Enterprise Background

Fuxin Fluoro-Chemical Co. Ltd. (Fuxin) was established in mid 1960s. Fuxin has one PTFE production line with annual capacity of 2,000 tons. CFC-113 is used as a process agent in manufacture of PTFE for recovering tetrafluoroethylene (TFE). The process is a continuous production and the number of operation days in 2003 is 319.

Name of the director and his contact information are as follow:

Dequan Sun
Technical Manager
Telephone: 0418-285-2957
Fax: 0418-285-2101
Address: Hanjiahedian, Xihe District, Fuxin, Liaoning 123002, P. R. China

Verification

The World Bank mission has taken the following verification steps at Fuxin:

- Listened to Mr. Sun's introduction of Fuxin and its production of PTFE;
- Visited production line of PTFE and took photos (Photos are provided in separated files (Folder:Fuxin-Photos));
- Visited warehouse of raw materials especially that of CFC-113 and took photos;
- Visited warehouse of PTFE and took photos;
- Checked financial records (2003) of raw materials and copied VAT receipts of all CFC-113 purchased in 2003;

- Checked financial records (2003) of final product (PTFE) and copied a set of sales receipt (VAT receipt) and packing record;

The financial records of CFC-113 and chlorinated PTFE are provided in separated file (File: Fuxin-Financial Records).

Conclusion

- Fuxin has good financial records;

- 2003 opening stock of CFC-113 is 1.0 tons. Closing stock of CFC-113 is 1.0 tons. Procurement of CFC-113 is 3.0 tons. Consumption of CFC-113 is 3.0 tons;

- 2003 beginning inventory of PTFE is 366 tons. Ending inventory of PTFE is 197 tons. Production of PTFE is 1,498 tons. Sale of PTFE is 1,667 tons;

- The mission did not find any discrepancies of CFC-113 or PTFE data.

WORLD BANK VERIFICATION FRAMEWORK

For

THE MLF AGREEMENTS FOR THE PHASE-OUT OF CONSUMPTION AND PRODUCTION OF CARBON TETRACHLORIDE IN INDIA AND CHINA

June, 2004

Introduction

As per ExCom Decision, the World Bank as implementing agency has been requested to develop and submit a monitoring and verification framework to the ExCom for the CTC sector plans. This document outlines the World Bank Monitoring and Verification framework for implementation of CTC Phase-out Plan for China and India.

The Multilateral Fund for the Implementation of the Montreal Protocol approved the CTC production phaseout as part of the Chinese Process Agent Sector Plan, Phase I, for China at its 38th meeting and the Indian CTC sector plan at its 40th meeting.. Both sector plans include a complete phaseout of production of CTC by 2010 and an elimination of CTC consumption in the solvent and process agents sector as defined in the two agreements. While the two agreements are different in approach and content, they both require monitoring and independent annual verification of CTC production and consumption to ensure that the agreed performance targets have been met. In both agreements, the Bank is required to verify annual CTC production and consumption.

Terms and Conditions of the Agreements

The Agreements define the terms "production" and "consumption" as agreed by the Parties of the Montreal Protocol.

(a) "Production" means the amount of controlled substance produced, minus the amount destroyed by technologies to be approved by the Parties and minus the amount entirely used as feedstock in manufacturing other chemicals. The amount recycled is not to be considered as "production."

(b) "Consumption" means production plus imports minus exports.

As a result any verification of "production" would require a verification of the total national CTC production, amount destroyed by approved technologies, any production used for ODS feedstock applications and for non-ODS feedstock applications Verification of "consumption" would similarly require a full verification of any import and export of CTC. Based on the Agreement between the ExCom and India, India uses CTC as feedstock for the production of DV acid chloride and for the production of CFC. China had not, at the time of approval of the Phase I sector plan, listed uses of CTC as feedstock for other than production of CFCs. The two agreements, consistent with the Montreal Protocol, do not limit possible future use of CTC for new non-ODS feedstock applications, but the use of CTC for feedstock must be confirmed and verified as part of the M&E to ensure that the agreed performance targets are fully met.

The Agreements also define the commitments of the Executive Committee to finance the complete phase-out of consumption and production of CTC prior to 1 January 2010. Grant funds from the Multilateral Fund will be released to China and India in tranches over the period from 2003 – 2009 in accordance with the Funding Disbursement Schedule providing that the maximum allowable consumption and production targets

stipulated in the agreements are fully met. Penalties are imposed as specified by the two agreements in case CTC production and consumption exceeds the agreed targets. The two agreements are included as annexes 1 and 2.

Verification Framework

In order to implement the decisions, verification will include the following components:

(a) Total annual CTC production, including production for CFC production and other feedstock applications.

(b) Total amount destroyed annually by approved technologies

(c) Total annual imports and exports of CTC.

Any other information would be derived from this basic information.

In addition, the China PA I agreement requires verification of CTC consumption in various PA sub-sectors. Verification of annual CTC consumption at the enterprise level would therefore be required, which again requires identification of all CTC consuming enterprises in the sub-sectors.

For the implementation of the agreements, the two countries have set up the following.

Overall management will be handled by the ozone units in the two countries.

Regulations controlling production and allowing the countries to issue CTC production and consumption quotas (only in China): The quota systems operate differently in the two countries, but the main principles are the same, i.e. annual national quotas are determined by the agreements. Annual production quotas are given to the CTC producing enterprises based on the principles established in the regulations.

The regulations require monthly/quarterly reporting on CTC to the national implementation offices in India and China.

CTC production verification

The annual verification will include the following components:

a) plant specific baseline information in terms of year of start of production, any changes in capacity compared to previous year, present production capacity, internal production of raw materials etc.
b) information on plant closures and plants dismantled during the year
c) CTC production and raw material consumption, and
d) sale of CTC and CTC stock at beginning and end of the year.

The verification requires preparatory work and on site verification of information.

Preparatory work

Before the verification, the plant will prepare a report containing the above information. The information would include monthly CTC production records; raw material purchase and sales records relevant for verifying CTC production and, in the case of chlormethane plants, CTC co-production; and beginning and end of year CTC and raw material stocks.

During plant visit

Documents and plant production logs should be made available and checked by the verification team, allowing full verification of the production and consolidation of the production against raw material consumption, sales records and stocks at the plant. The review and check of records should be based on random spot checking of data, records and invoices consistent with normal verification and audit principles. The extent of record verification would depend on the operation, e.g. continuous production, batch and/or campaign production, co-production of other chemicals etc. The extent of verification would to some extent be plant specific. But it would be expected that at least three full months, randomly selected, would be fully checked by the verification team.

The verification report would consist of the following components:

Part A: Baseline information for CTC production facilities

The baseline in terms of year of establishment of the production facility will be covered by Part A (see annex 3) of the verification report, i.e., annual production capacity and production in the year used as basis for the MLF approval of the sector plans, production of raw materials for the production of CTC and possible co-production of other chemicals and status of production has been verified both by the Secretariat of the Multilateral Fund and by the World Bank. Each annual verification report will include the baseline information and any changes since the last annual verification report.

Part B: Verification of plant closure

For plants closed during the year, the verification will consist of the following two parts: any CTC production in the year before it stopped production (covered by Part B), and a verification of dismantling and environmentally safe disposal of the plant, including safe management of any remaining stock of CTC and other chemicals at the plant.

Part C: Annual CTC production verification

To verify CTC production at each production facility, the following are to be verified and checked at each plant using normal audit principles:

(a) For dedicated CTC producers, monthly CTC production should be verified based on plant production logs. For chlormethane plants, the total quantities of all chloromethane products (methyl chloride, methylene chloride, chloroform, and carbon tetrachloride) should be verified from production logs and excise records. Information on number of days in production should be recorded as part of the verification report,
(b) Monthly opening and closing stocks for CTC and of all chloromethane products at each production facility should be verified,
(c) Records of raw material production purchases (i.e., methane or methanol, chlorine, and hydrochloric acid) should be reviewed,
(d) Monthly records of internal CTC uses for CFC and other feedstock application should be verified,
(e) Purchase of CTC from other producers and dealers or through import should be recorded as part of the verification process, and
(f) Sale of CTC should also be verified and financial records should be reviewed to consolidate the production figures.

This will establish the total production of CTC which could later on be used by both feedstock and non-feedstock applications.

In case CTC producers have any surplus of CTC that is destined for destruction, it is proposed that CTC producers should report to [NOU of the Country] on the quantity to be destroyed and the type of the destruction technology that will be employed. If this requirement is not fulfilled, CTC producers will not be allowed to discount this quantity from their production level.

The verification report for each plant should include the following information:

a. Plant identification (name, technical audit number, address, contact person and functional title, telephone and fax numbers, and e-mail address);

b. Verification team composition (name and functional title);

c. Production Method-description, if it is a co-producer, please state the range of ratio of CTC output in co-production

d. Plant history (date of construction, number of lines for CTC production, baseline year –2000 - capacity, and production for 2002); and

e. Plant activity in the year, including data for the baseline year, 2002 and 2003, and will cover the following for each CTC producer:

i) CTC quotas, opening and closing annual stocks, production, and sales;

ii) Annual Methanol/CTC, Chlorine/CTC and other feedstock/CTC ratios;

iii) Number of operating days of CTC production; and

iv) Monthly production of CTC, monthly raw material stocks (opening, procured or added, and closing) and monthly raw material consumption.

Part D: Verification of CTC used as feedstock for CFC and other ODS chemicals

CTC used as feedstock for CFC should be verified as part the annual CFC production verification.

Part E: Verification of CTC used as feedstock for non-ODS chemicals

To be qualified as non-ODS feedstock consumption, the use must be reviewed and confirmed as a feedstock application by the national ozone authorities. For each review the company should submit an application with full detailed descriptions of the chemical process, the use of CTC as feedstock, CTC consumption per kg of the product and other relevant information. A national review process needs to be carried out to confirm the use of CTC as a feedstock application in line with the Montreal Protocol provisions.

The list of CTC feedstock users should be provided before the verification team starts its work. The CTC consumption by each feedstock user should be verified through production records for the chemical for which the CTC was used. The consumption of CTC per kg of the chemical could be established based on past records and the chemical process. In order to confirm the CTC consumption, it might be necessary to check sales of the chemical are congruent with the CTC consumption data. In addition, the source of CTC, i.e. imported by the feedstock consumer, procured locally from CTC producers or from CTC dealers, might be useful information to confirm consumption and the overall management of the CTC phaseout program.

Feedstock users might be required to maintain their CTC purchasing records and records of yearly opening and closing stocks of CTC. In addition, the production logs of chemicals using CTC as feedstocks including ratio, e.g. final product/CTC, should be reviewed. Based on the production records and the production ratio, the total amount of CTC that is chemically converted into other chemicals during the production process could be determined. This will establish the total CTC used for feedstock applications.

Part F: Verification of CTC import and export

China issued a ban on CTC in 1999, hence imports should be zero for China. For India, the ozone regulations require that any enterprises importing CTC to India must obtain a license and an import permit in which the amount to be imported should be specified by the Ozone Cell. At present, CTC is only imported to India by CFC producers, the DV acid chloride industry and by the companies using CTC as process agent.

To establish or verify the actual quantity of CTC imported, it is proposed that customs records on all CTC imports should be verified on an annual basis. Information to be collected should include:

- Names of the ports where CTC enters India;
- Import license number;
- Country of international suppliers;
- Date of imports;
- Names of importers; and
- Quantity of each shipment

Customs records will be corroborated with import records maintained by CFC producers, the DV acid chloride industry, and the process agent industry. This will establish the total amount of CTC that is actually imported to India during the calendar year.

Any enterprises planning to export CTC must obtain an export license and an export permit including the approved quantity for export. To obtain a license, it is required to provide the name of the port where CTC shipment will take place, the quantity to be exported, the buyer, and destination of the shipment. This allows the focal point managing ODS import/export to confirm the actual quantity of CTC exported directly with the customs office.

Part G: Verified National CTC Production and Consumption

The actual levels of CTC production and consumption as per the Agreement for the CTC phase-out plan for India could be established based on the verified data above.

National Production = Total CTC Production of All Producers minus Total CTC Destroyed with Approved Technology by all Producers minus Feedstock Consumption of CTC;

National Consumption = Production + Import – Export.

National CTC account

	2003	2004	2005	2006	2007	2008	2009
Gross Production							
ODS Feedstock uses							
Non-ODS feedstock uses							
Destroyed							
National production							
National Production							
Export							
Import							
National consumption							

Part H: Verification of CTC/CFC-113 consumption of enterprises using ODS as process agents

The China agreement specifically requires verification of consumption of CTC and CFC-113 in specific sub sectors of the process agent sector. The only way to do so would be to a) identify all companies in the given category and then verify the annual consumption by each individual CTC consuming process agent and solvent company. In the case of China the segments are specified in the agreement. Verification would require that the aggregate CTC consumption by the individual companies is below the agreed level.

Managing consumption on a company level has not been done in any country and constitutes a major challenge to China. The only way would be to introduce a CTC consumption quota system, ensuring that individual companies stay within the allocated quota, or buy quotas from other CTC consuming companies.

From a verification view, it would be necessary to verify annual procurement and start and end of year stocks at each company. The consumption level might have to be verified against the production of products for which CTC is used as a process agent.

The following information is needed to verify aggregate consumption:

a) CTC procurement records
b) Internal stock of CTC at the beginning and the end of the year
c) Production (quantity) of the product for which CTC is used as process agent and typical ratio between the product and CTC (kg/kg)
d) Sales records to confirm the production level. If necessary information on start and end of year stock to corroborate the overall production level.