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APROBADA: Hon. Ferdinand Mercado
Secretario de Estado

POR: 
Secretaria Auxiliar de Servicios

Enmiendas al Reglamento para el Control de la Contaminación
Atmosférica de la Junta de Calidad Ambiental para cumplir con
los requisitos para Planes Estatales de la Sección 111(d) de la
Ley Federal de Aire Limpio para implantar las Guías de
Emisiones para Sistemas de Relleno Sanitario



ESTADO LIBRE ASOCIADO DE PUERTO RICO
OFICINA DE LA GOBERNADORA
Junta de Calidad Ambiental

De acuerdo con la Ley sobre Política Pública Ambiental (Ley Número 9 aprobada el 18 de junio de 1970, según enmendada) y la Ley Federal de Aire Limpio Sección 111 (d), según enmendada. (42 U.S.C.A. § 7411 (d)) se ha enmendado la

REGLA 102 Y PARTE VII DEL
REGLAMENTO PARA EL CONTROL DE LA CONTAMINACIÓN
ATMOSFÉRICA

Estas enmiendas fueron promulgadas por la Resolución R-2001-02-06 del 20 de febrero de 2001 con el propósito de proteger la calidad natural del aire y para prevenir, eliminar y controlar la contaminación atmosférica; para establecer normas y requisitos para la prevención, eliminación y control de la contaminación atmosférica debido a los gases generados por los Vertederos de Desperdicios Sólidos Municipales.

Jorge Marrero Huertas
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REGLA 102 DEFINICIONES

Administrador

Significa el Administrador de la Agencia Federal de Protección Ambiental (APA).

APA

Significa la Agencia Federal de Protección Ambiental.

Antorcha

Significa una cámara de combustión abierta, no cubierta ni cerrada.

Cámara de Combustión Encerrada

Significa un recipiente de fuego encerrado que mantiene una temperatura máxima limitada relativamente constante, generalmente usando un suministro limitado de aire de combustión. Una antorcha encerrada es considerado una cámara de combustión encerrada.

Capacidad de Diseño

Significa la cantidad máxima de desperdicios sólidos que un Sistema de Relleno Sanitario puede aceptar como está especificado en el permiso de construcción o de operación emitido por la Junta.

Captura Eficazmente

Significa la recolección de gas obtenido por un sistema de recolección que cumple con los criterios especificados en la Regla 702(f)(2).

Cieno (Para propósitos de la Parte VII)

Significa cualquier desperdicio sólido, semisólido o líquido generado por una planta de tratamiento de aguas usadas municipal, comercial o industrial, planta de tratamiento de suministro de agua o una instalación de control de contaminación atmosférica, exceptuando el efluente tratado de una planta de tratamiento de aguas usadas.

Clausura ó Cierre (Para propósitos de la Parte VII)

Acto de clausurar una instalación para almacenamiento, tratamiento o disposición de desperdicios sólidos después que ésta o parte de ésta haya cesado de recibirlos, de manera que se satisfagan las condiciones y requisitos establecidos en el Reglamento para el Manejo de los Desperdicios Sólidos No Peligrosos.

CONM

Significa compuestos orgánicos no metano medidos de acuerdo con las disposiciones del 40 CRF 60.754 y la Regla 704 de este reglamento.

Densidad Suficiente

Significa cualquier número, espacio y combinación de componentes de un sistema de recolección incluyendo pozos verticales, recolectores horizontales y recolectores superficiales, necesarios para mantener un control migratorio y de emisión como es determinado mediante mediciones de rendimiento establecidos en la Parte VII de este reglamento.

Desperdicio No-Degradable

Significa cualquier desperdicio que no se descompone mediante rompimiento químico o actividad microbiológica. Ejemplos son, pero sin limitarse a, el concreto, la ceniza de la combustión de desperdicios municipales y los metales.

Desperdicios Sólidos

Cualquier basura, desecho o cieno de una planta de tratamiento de aguas usadas, planta de tratamiento para suministro de agua o una instalación de control de contaminación atmosférica y otro material descartado incluyendo materiales sólidos, líquidos, semisólidos o recipientes que contienen material gaseoso generado por operaciones industriales, comerciales, de minería y agrícolas y de actividades en la comunidad, pero no incluye material sólido o disuelto en el sistema de alcantarillado sanitario o sólidos o materiales disueltos en el flujo de retorno en la irrigación o descargas industriales que son fuentes precisadas sujetas a permisos bajo el 33 U.S.C. 1342, ni fuente nuclear especial o productos secundarios, como se definen en la Ley Federal de Energía Atómica de 1954, según enmendada (42 U.S. C. 2011 et seq.).

Desperdicio Sólido Industrial (Para propósitos de la Parte VII)

Desperdicio sólido generado por los procesos industriales y de manufactura que no son desperdicios peligrosos regulados bajo el Subtítulo C de la Ley de Conservación y Recuperación de Recursos, Partes 264 y 265 del Título 40. Tales desperdicios pueden incluir, pero sin limitarse a, desperdicios que resultan de los siguientes procesos de manufactura: generación de energía eléctrica; sustancias químicas fertilizantes/agrícolas; comida y productos relacionados o secundarios, sustancias químicas inorgánicas; manufactura de hierro y acero; cuero y productos de cuero; manufactura/fundición de metales no ferrosos; sustancias químicas orgánicas; manufactura de plásticos y resina; industria de papel y pulpa; productos de goma y plásticos; piedra, vidrio, arcilla y productos de concreto;

manufactura de materia textil; equipo de transportación y tratamiento de agua. Este término no incluye desperdicios de minería o desperdicio de aceite y gas.

Emisiones de un Sistema de Relleno Sanitario Municipal ó Emisiones de un SRS Municipal

Significa el gas generado por la descomposición del desperdicio orgánico depositado en un SRS Municipal ó derivado de la evolución de los compuestos orgánicos en el desperdicio.

Equipo Mover de Gas

Significa el equipo (e.g., abanico, ventilador, compresor) usado para transportar el gas del Sistema de Relleno Sanitario a través del sistema recolector.

Expansión lateral (Para propósitos de la Parte VII)

Significa una expansión horizontal de los límites de desperdicios de un vertedero DSM existente. Una expansión lateral no es una modificación a menos que ésta resulte en un aumento en la capacidad de diseño del vertedero.

JCA

Significa la Junta; la Junta de Calidad Ambiental del Gobierno de Puerto Rico.

Junta

Significa la Junta de Calidad Ambiental (JCA) del Gobierno de Puerto Rico.

Modificación (Para propósitos de la Parte VII)

Significa un aumento en la capacidad de diseño en volumen permitida del vertedero por expansión lateral o vertical basándose en su capacidad de diseño permitida al 30 de mayo de 1991.

Sistema de Recolección Activo

Significa un sistema de recolección de gases que usa un equipo mover de gas.

Sistema de Recolección Pasivo

Significa un sistema de recolección de gas que solamente usa presión positiva en el interior del Sistema de Relleno Sanitario para mover el gas en vez de usar un equipo mover de gas.

Sistema de Relleno Sanitario ó SRS (Vertedero) (Para propósitos de la Parte VII)

Significa una instalación de disposición en un espacio geográfico continuo donde se colocan desperdicios domésticos en o sobre la tierra. Un SRS puede recibir otros tipos de desperdicios RCRA Subtítulo D tales como desperdicios sólidos comerciales, ceno no peligroso, desperdicios de generadores de pequeñas cantidades condicionalmente exentos y desperdicios sólidos industriales. Las partes de SRS pueden estar separadas por carreteras de acceso. Un SRS puede ser operado por el gobierno o por una empresa privada. Un SRS puede ser uno nuevo, un SRS existente o una expansión lateral.

Sistema de Relleno Sanitario Activo

Significa un Sistema de Relleno Sanitario en el cual se está depositando desperdicios sólidos o un Sistema de Relleno Sanitario con planes de aceptar desperdicios sólidos en el futuro.

Sistema de Relleno Sanitario Cerrado

Significa un sistema de relleno sanitario en el cual no se está depositando desperdicios sólidos y en el cual no se colocarán desperdicios sólidos adicionales in llenar una notificación de modificación ordenada bajo el 40 CRF 60.7 (a)(4). Una vez una notificación de modificación ha sido llevada y se coloquen desperdicios sólidos adicionales en el sistema de relleno sanitario, el sistema de relleno sanitario no está cerrado. Un sistema de relleno sanitario está considerado cerrado después de cumplir con los criterios de la §258.60 del 40 CRF.

Sistema de Relleno Sanitario Controlado

Significa cualquier Sistema de Relleno Sanitario al cual se le requiere un sistema de recolección y control bajo la Parte VII del Reglamento para el Control de la Contaminación Atmosférica como resultado de la tasa de emisión de compuestos orgánicos no-metano. El Sistema de Relleno Sanitario es considerado controlado al momento de que un plan de diseño de un sistema de recolección y control es sometido en cumplimiento con la Regla 702(f)(1).

Sistema de Relleno Sanitario Municipal ó SRS Municipal (Para propósitos de la Parte VII)

Ver Sistema de Relleno Sanitario o SRS (Vertedero).

Tasa de Extracción Suficiente

Significa la tasa suficiente para mantener una presión negativa durante la operación normal en todos los pozos del sistema de recolección sin que cause filtración de aire incluyendo cualquier pozo conectado al sistema como resultado de una expansión o de exceso de emisiones superficiales, durante la vida operacional del ventilador.

Parte VII. Guías de Emisión e Itinerario de Cumplimiento para los Sistemas de Rellenos Sanitarios Municipales

REGLA 701 APLICABILIDAD

Las disposiciones de esta Parte VII aplican a cada Sistema de Relleno Sanitario (SRS) municipal existente cuya construcción, reconstrucción o modificación comenzó antes del 30 de mayo de 1991. Cambios operacionales o físicos hechos a un SRS municipal existente con el propósito de cumplir con las disposiciones de esta Parte no son considerados como una modificación o reconstrucción. Las actividades requeridas por o realizadas de acuerdo con una acción de remediación del estado, CERCLA o RCRA no son consideradas construcción, reconstrucción o modificación.

Las disposiciones de esta Parte aplican en todo momento, excepto durante períodos de encendido, cierre o en desperfectos, siempre que la duración del encendido o cierre o en desperfecto no exceda de 5 días para los sistemas de recolección y no exceda de 1 hora para el tratamiento o instrumento de control.

REGLA 702 GUIAS DE EMISIÓN PARA LAS EMISIONES DE LOS SISTEMAS DE RELLENO SANITARIO MUNICIPALES

(a) Instalaciones Afectadas

Cualquier SRS municipal que reúna las siguientes tres condiciones deberá cumplir con los requisitos de control enumerados en la Regla 702(f).

- (1) Un Sistema de Relleno Sanitario que haya aceptado desperdicios en cualquier momento desde el 8 de noviembre de 1987, o tiene una capacidad disponible de diseño adicional para una futura acumulación de desperdicios;
- (2) El Sistema de Relleno Sanitario con una capacidad de diseño igual o mayor a 2.5 millones de megagramos y 2.5 millones de metros cúbicos. El SRS puede calcular la capacidad de diseño en megagramos o metros cúbicos para la comparación con los valores de exención. Cualquier conversión usando la densidad del desperdicio deberá ser documentado y sometido junto con el informe inicial de la capacidad de diseño; y
- (3) Un Sistema de Relleno Sanitario con una tasa de emisión igual o mayor que 50 megagramos por año de compuestos orgánicos no-metano (CONM).

(b) Informe Inicial de la Capacidad de Diseño

El dueño u operador de un SRS Municipal con una Capacidad de Diseño menor de 2.5 millones de megagramos por masa o 2.5 millones de metros cúbicos por volumen deberá someter un informe inicial de la capacidad de diseño a la Junta en cumplimiento con la Regla 707(a). El dueño u operador de un SRS puede calcular la Capacidad de Diseño en megagramos o metros cúbicos para comparación con los valores de exención. Cualquier conversión usando la densidad del desperdicio deberá ser documentado y sometido junto con el informe.

- (1) El dueño u operador deberá someter a la Junta un informe enmendado de la capacidad de diseño como dispone la Regla 707(a)(3), cuando haya cualquier aumento en la Capacidad de Diseño de un SRS afectado por las disposiciones de esta Parte, ya sea porque el aumento resulta de un aumento en el área o profundidad del SRS, o por un cambio en los procedimientos operacionales del SRS, o por cualquier otro medio.
- (2) Si cualquier aumento en la Capacidad de Diseño de un SRS resulta en una Capacidad de Diseño máxima revisada igual o mayor que 2.5 millones de megagramos y 2.5 millones de metros cúbicos, el dueño u operador deberá cumplir con las disposiciones de la Regla 702(d).

(c) Requisitos de Permiso

- (1) Para propósitos de la Parte VI, un Sistema de Relleno Sanitario con una capacidad menor de 2.5 millones de megagramos o 2.5 millones de metros cúbicos no requerirá un permiso de operación bajo la Parte VI de este Reglamento, a menos que sea una fuente mayor por cualquier otra razón. Un SRS cerrado que no esté afectado por los requisitos de permiso de la Parte VI está exento de cumplir con los requisitos de permisos de las Reglas 203 y 204 del Reglamento para el Control de la Contaminación Atmosférica (RCCA). Un SRS activo que no esté afectado por los requisitos de la Parte VI está exento de cumplir con los requisitos de permiso de las Reglas 203 y 204 del RCCA, si este SRS no está afectado por cualquier otra regulación y notifica a la Junta, por escrito, un reclamo de exención junto con el Informe de Capacidad de Diseño. Un SRS activo que opera con un permiso previo bajo la Regla 204 automáticamente estará exento a la fecha de expiración del permiso si la condición de exención se mantiene. Cuando un Sistema de Relleno Sanitario está cerrado, y nunca necesitó controles o reúne las condiciones para la remoción del sistema de control según especificados en la Regla 702(f)(4), entonces no se requerirá que mantenga un permiso de operación bajo la Parte VI.

- (2) Cualquier SRS existente, activo o cerrado, que se le requiera someter un informe inicial de capacidad de diseño y un primer informe anual de la tasa de emisión deberá hacerlo dentro de 90 días después de la fecha de efectividad del Plan Federal para implantar las Guías de Emisión para Sistemas de Relleno Sanitario o para el 7 de abril de 2000. Cualquier SRS existente que no esté exento y se le requiera cumplir con las Reglas 203 y 204 del RCCA deberá someter una solicitud de permiso junto con estos informes. Cualquier SRS existente, activo o cerrado, que se le requiera cumplir con la Parte VI del RCCA someterá una solicitud de permiso Título V dentro de 12 meses después del primer informe de capacidad de diseño.

(d) Opciones de Control

El dueño u operador de un SRS Municipal con capacidad de diseño igual o mayor que 2.5 millones de megagramos y 2.5 millones de metros cúbicos, deberá cumplir con la Regla 702(f) o calcular la tasa de emisión de CONM para el SRS usando los procedimientos especificados en la Regla 704. La tasa de emisión de CONM deberá ser recalculada anualmente, excepto lo provisto en la Regla 707(b)(1)(ii). El dueño u operador de un SRS Municipal, afectado por la Parte VII, con una capacidad de diseño igual o mayor que 2.5 millones de megagramos y 2.5 millones de metros cúbicos está sujeto a los requisitos de permiso de la Parte VI.

(e) Requisitos para Sistemas de Relleno Sanitario con emisiones menores que 50 Mg/año

Si la tasa de emisión de CONM es menor que 50 Mg/año, el dueño u operador deberá:

- (1) Someter a la Junta un informe anual de emisión o un estimado de la tasa de emisión de CONM para el período de los próximos 5 años en cumplimiento con la Regla 707(b)(1)(ii); y
- (2) Incluir en el informe anual requerido por la Regla 707(b) una recalculación de la tasa de emisión de CONM anualmente usando los procedimientos especificados en la Regla 704(a) hasta tanto la tasa de emisión de CONM sea igual o mayor que 50 megagramos por año o hasta que el Sistema de Relleno Sanitario sea cerrado.
 - (i) Si la tasa de emisión de CONM es igual o mayor que 50 megagramos por año, el dueño u operador deberá, dentro de los 30 meses después de la fecha en que el Sistema de Relleno Sanitario adquiera una tasa de emisión de 50 megagramos por año, instalar un sistema de recolección y control en cumplimiento con la Regla 702(f) que capture eficazmente el gas generado dentro de un Sistema de Relleno Sanitario. La fecha para someter el informe anual requerido por la Regla 707(b)(1) determinará la fecha en que la condición en la Regla 702 (a) (3) es alcanzada.

- (ii) Si el SRS es cerrado permanentemente, una notificación de clausura deberá ser sometida a la Junta como se dispone en la Regla 707(d).
- (f) Requisitos para Sistemas de Relleno Sanitario con emisiones igual o mayor que 50 Mg/año.**
- (1) Si la tasa de emisión de CONM calculada es igual o mayor que 50 megagramos por año, el dueño u operador deberá cumplir con el siguiente itinerario:
 - (i) Someter un plan de diseño del sistema de revolución y control específico del lugar preparado por un ingeniero profesional a la Junta. El dueño u operador del vertedero someterá un plan de diseño del sistema de recolección y control dentro de un año de la fecha del informe inicial de la tasa de emisión de CONM o del primer informe anual de la tasa de emisión que demuestre que la tasa de emisión de CONM es 50 Mg/año o mayor. Los vertederos existentes que sean más grandes que la capacidad máxima de diseño limitativa deberán someter su primer informe anual de la tasa de emisión con el informe de capacidad de diseño dentro de 90 días de la fecha de efectividad del Plan Federal de la APA.
 - (A) El sistema de recolección y control descrito en el plan deberá reunir los requisitos de diseño del párrafo (f)(1)(iv) de esta Regla.
 - (B) El plan de diseño del sistema de recolección y control deberá incluir cualquier alternativa a las normas operacionales, métodos de prueba, procedimientos, medidas de cumplimiento, muestreo, mantenimiento de registro o disposiciones de informe de las Reglas 703 a la 708 que sean propuestos por el dueño u operador y aprobados por la APA.
 - (C) El plan de diseño del sistema de recolección y control deberá ser en conformidad con las especificaciones para Sistemas de Recolección Activa de la Regla 709 o incluir una demostración a la APA y a satisfacción de la Junta de la suficiencia de las disposiciones alternas para cumplir con la Regla 709.
 - (D) La Junta revisará la información sometida en el plan de diseño del sistema de recolección y control y aprobará, desaprobará o requerirá información adicional. Por la

variedad de factores específicos del lugar envueltos en el diseño de los sistemas de gas de un Sistema de Relleno Sanitario, algunos sistemas alternos podrían ser necesarios. Una gran variedad de diseños de sistemas son posibles, tales como pozos verticales, combinación de sistemas de recolección horizontales y verticales, trincheras horizontales, componentes de recolección de lixiviados y otros sistemas pasivos.

- (E) El tiempo para la aprobación del plan de diseño será dentro de 120 días de haberlo sometido. La Junta hará una revisión preliminar del diseño del sistema y someterá sus comentarios al vertedero dentro de 60 días. El dueño u operador responderá a los comentarios de la revisión preliminar dentro de 30 días. La Junta completará la revisión final a las respuestas del vertedero a la revisión preliminar dentro de otros 30 días.

- (ii) Otorgar los contratos necesarios para la construcción de los sistemas de recolección y control o las órdenes para comprar los componentes dentro de 20 meses después del informe inicial de la tasa de emisión de CONM o del primer informe anual de la tasa de emisión que demuestre que las emisiones de CONM son iguales o mayores que 50 Mg/año.

- (iii) Iniciar la construcción o instalación del sistema de recolección y control dentro de 24 meses después del informe inicial de la tasa de emisión de CONM o del primer informe anual de la tasa de emisión que demuestre que las emisiones de CONM son iguales o mayores que 50 Mg/año.

- (iv) Completar la construcción o instalación del sistema de recolección y control dentro de 30 meses después del informe inicial de la tasa de emisión de CONM o del primer informe anual de la tasa de emisión que demuestre que las emisiones de CONM son iguales o mayores que 50 Mg/año, que capture eficazmente el gas generado dentro del SRS y que cumpla con los siguientes requisitos:
 - (A) Un Sistema de Recolección Activo deberá:
 - (1) Ser diseñado para manejar la razón de flujo de gas máximo esperado de toda el área del Sistema de Relleno Sanitario que garantice el control sobre el

período de uso deseado del equipo de control de gas o del equipo del sistema de tratamiento;

- (2) Recolectar el gas de cada área, celda, o grupo de celdas del Sistema de Relleno Sanitario en el cual se hayan depositado inicialmente desperdicios sólidos por un período de:
 - (i) 5 años o más, si está activo; ó
 - (ii) 2 años o más, si está cerrado o en su etapa final;
 - (3) Recolectar el gas a una Tasa de Extracción Suficiente;
 - (4) Ser diseñado para minimizar la migración del gas del subsuelo fuera del Sistema de Relleno Sanitario.
- (B) Un Sistema de Recolección Pasivo deberá:
- (1) Cumplir con las disposiciones especificadas en la Regla 702(f)(1)(iv)(A)(1), (2) y (4).
 - (2) Ser instalado con forros o revestimiento en el fondo y en todos los lados de todas las áreas en donde se va a recolectar el gas. Los forros o revestimiento deberán ser instalados como es requerido bajo la Sección 258.40 del 40 CRF e incluida en los Apéndices de este Reglamento.
- (v) Completar la construcción de acuerdo con el diseño especificado en el plan de control final aprobado y conectar el sistema de recolección de gases del vertedero y el equipo de control de contaminación atmosférica tal que éstos operen completamente. Este cumplimiento final debe ser logrado dentro de 30 meses después del informe inicial de la tasa de emisión o del primer informe anual de la tasa de emisión que demuestre que las emisiones de CONM son iguales o mayores que 50 Mg/año.
- (vi) Una prueba de funcionamiento debe ser efectuada dentro de 180 días a partir de la construcción o instalación del sistema de recolección y control y de logrado el cumplimiento final.

- (2) Dirigir todo el gas recolectado a un sistema de control que cumpla con los siguientes requisitos:
- (i) Una antorcha abierta diseñada y operada de acuerdo con la Sección 60.18 del 40 CRF e incluida en los apéndices de este Reglamento;
 - (ii) Un sistema de control diseñado y operado para reducir los CONM en 98% por peso; o
 - (iii) Una cámara de combustión encerrada diseñada y operada para reducir la concentración de CONM a menos de 20 partes por millón por volumen medido como hexano, en una base seca a 3% de oxígeno. La eficiencia de reducción o las partes por millón por volumen deberán ser establecidos por una prueba de funcionamiento inicial, usando los métodos de prueba especificados en la Regla 704(h).
 - (A) Si una caldera o un calentador de proceso es usado como instrumento de control, la corriente de gas del Sistema de Relleno Sanitario deberá ser introducida dentro de la zona de flama.
 - (B) El instrumento de control deberá ser operado dentro de los intervalos del parámetro establecido durante la prueba de funcionamiento inicial o la más reciente. Los parámetros de operación a ser monitoreados están especificados en la Regla 706;
 - (iv) Dirigir el gas colectado a un sistema de tratamiento que procese el gas recolectado para un subsecuente uso o venta. Todas las emisiones desde un respiradero atmosférico del sistema de tratamiento de gas estarán sujetos a los requisitos del párrafo (f)(2)(i), (ii) o (iii) de esta Regla.
- (3) Operar el equipo de recolección y control instalado de acuerdo con las disposiciones de las Reglas 703, 705 y 706.
- (4) Tapar o remover el sistema de recolección y control cuando se den las siguientes condiciones:
- (i) El Sistema de Relleno Sanitario no aceptará más desperdicios sólidos y será cerrado permanentemente bajo los requisitos de la Sección 258.60 del 40 CRF e incluidos en los Apéndices de este Reglamento. Un informe de clausura deberá ser sometido a la Junta como está

dispuesto en la Regla 707(d);

- (ii) El sistema de recolección y control ha estado en operación por un mínimo de 15 años; y
- (iii) Siguiendo los procedimientos especificados en la Regla 704(f), cuando el gas CONM calculado y producido por el Sistema de Relleno Sanitario sea menor que 50 megagramos por año en tres fechas de pruebas consecutivas. Las fechas de prueba no podrán tener menos de 90 días de separación entre ellas y no más de 180 días.

REGLA 703 ESTANDARES OPERACIONALES PARA SISTEMAS DE RECOLECCIÓN Y CONTROL

(a) Requisitos operacionales

El dueño u operador de un sistema de recolección y control de gases de un Sistema de Relleno Sanitario municipal deberá:

- (1) Operar el sistema de recolección de forma que el gas sea recolectado desde cualquier área, celda o grupo de celdas de SRS municipal donde los desperdicios sólidos se hayan depositado por:
 - (i) 5 años, si está activo; o
 - (ii) 2 años o más si está cerrado o en la etapa final;
- (2) Operar el sistema de recolección en presión negativa en cada cobertura de pozo excepto bajo las siguientes condiciones:
 - (i) En caso de fuego o aumento de temperatura del pozo. El dueño u operador deberá registrar los eventos donde haya presión positiva para evitar fuegos. Estos registros deben someterse con el informe anual que se requiere bajo la Regla 707(f)(1);
 - (ii) Durante el uso de una geo-membrana o cubierta sintética. El dueño u operador deberá desarrollar unos límites de presión aceptables en el plan de diseño;
 - (iii) Un pozo decomisado. Un pozo puede experimentar presión estática positiva luego del cese para ajustar los cambios en flujo. Todos estos cambios deben ser aprobados por la APA.

- (3) Operar la cubierta interior del pozo de cada sistema de recolección bajo una temperatura del gas de un Sistema de Relleno Sanitario menor que 55°C y bajo un nivel de nitrógeno menor que 20 por ciento o un nivel de oxígeno menor que 5 por ciento. El dueño u operador podrá establecer valores mayores de temperatura operacional, nitrógeno u oxígeno en cualquier pozo. Cualquier demostración de valores operacionales altos deben estar sustentados por datos que demuestren que dichos parámetros no causarán fuegos o evite la descomposición anaeróbica significativamente al destruir los metanógenos.
- (i) El nivel de nitrógeno se determinará mediante el Método 3C del Apéndice A del 40 CRF Parte 60, según incorporado en este reglamento, a menos que un método alternativo sea establecido y aprobado por la APA.
 - (ii) A menos que otro método alternativo se haya establecido, el nivel de oxígeno será determinado por un sensor de oxígeno usando el Método 3A del Apéndice A del 40 CRF Parte 60, según incorporado en esta reglamentación excepto que:
 - (A) El intervalo debe fluctuar entre 20 y 50 por ciento del límite reglamentario;
 - (B) No se requiere un registro de datos;
 - (C) Para el *cero* y el intervalo se necesitan solamente 2 gases de calibración y, el medio de aire puede usarse para el intervalo;
 - (D) No se requiere verificar la calibración del error;
 - (E) La desviación estándar permitida es de más o menos 10 por ciento.
- (4) Operar el sistema de recolección de modo que la concentración de metano sea menor que 500 partes por millón sobre el valor trasfondo en la superficie del SRS. Para determinar si este nivel se ha excedido, el dueño u operador deberá realizar un muestreo de superficie a lo largo del perímetro del área de recolección mediante un patrón que divida transversalmente a intervalos de 30 metros el Sistema de Relleno Sanitario y que mediante observación visual se pueda detectar concentraciones altas del gas de Sistema de Relleno Sanitario tales como vegetación afectada, roturas o rajaduras en las cubiertas. El dueño u operador podrá demostrar que usando un patrón transversal alternativo consigue cubrir un área equivalente. Deberá desarrollarse un plan de

muestreo superficial que incluya mapa topográfico con la ruta de muestreo y cualquier justificación de las desviaciones de los intervalos de 30 metros específicas del sitio. Se podrán excluir del muestreo superficial aquellas áreas de pendientes altas o áreas peligrosas.

- (5) Operar el sistema de forma tal que todos los gases recolectados se ventilan al sistema de control diseñado y operado en cumplimiento con la Regla 702(f)(2). En aquellos casos que el sistema de control o de recolección esté inoperante, el sistema motriz del gas deberá cesar y se cerrarán las válvulas de sistema de recolección y de control que ventilan a la atmósfera tan pronto como sea posible pero sin exceder la primera hora de detectarse el suceso inoperante o desperfecto; y
- (6) Operar en todo momento el sistema de control o tratamiento mientras se esté dirigiendo los gases al sistema.

(b) Acciones Correctivas

Una acción correctiva será necesaria según lo especifica la Regla 705(a)(3) al (5) o la Regla 705(c) si el muestreo refleja que no se cumplen los requisitos operacionales descritos en la Regla 703(a)(2), (3), (4) o (5). Cualquier excedencia de muestreo no se considerará una violación de los requisitos operacionales de esta sección si se toman acciones correctivas según lo especifica la Regla 705. Fallar en tomar las acciones correctivas necesarias constituirá una violación.

REGLA 704 PROCEDIMIENTOS Y METODOS DE PRUEBA

(a) Cómputo de las emisiones de CONM

El dueño u operador del vertedero calculará la tasa de emisión de CONM usando la ecuación provista en la Regla 704(a)(1) o la ecuación provista en la Regla 704 (a)(2).

Los valores para ser usados en ambas ecuaciones son 0.05 al año para k , 170 metros cúbicos por megagramo para L_0 , y 4,000 partes por millón por volumen como hexano para el C_{CONM} .

- (1) La siguiente ecuación se usará si la tasa actual año-a-año de aceptación de desperdicios sólidos se conoce.

$$M_{NMOC} = \sum_{i=1}^n 2 k L_0 M_i (e^{-kt})^i (C_{CONM}) (3.6 \times 10^{-9})$$

donde,

| | | |
|----------------------|---|---|
| M_{CONM} | = | Tasa total de la emisión de CONM desde el SRS, megagramos al año |
| k | = | constante de la tasa de generación de metano, año ⁻¹ |
| L_0 | = | potencial de generación de metano, metros cúbicos por megagramo de desperdicios sólidos |
| M_i | = | masa de desperdicio sólido en la sección i th , megagramos |
| t_i | = | edad de la sección i th , años |
| C_{CONM} | = | concentración de CONM, partes por millón por volumen como hexano |
| 3.6×10^{-9} | = | factor de conversión |

Si el dueño u operador cumple con las disposiciones de documentación de la Regla 708 (d)(2), la masa del desperdicio sólido no-degradable puede restarse de la masa total del desperdicio sólido en una sección particular del SRS cuando se calcule el valor para M_i .

- (2) La siguiente ecuación se usará si la tasa actual año-a-año de aceptación de desperdicios sólidos es desconocido.

$$M_{\text{CONM}} = 2L_0 R (e^{-kt} - e^{-kt}) (C_{\text{CONM}}) (3.6 \times 10^{-9})$$

donde,

| | | |
|-------------------|---|---|
| M_{CONM} | = | Tasa de emisión de CONM, megagramos al año |
| L_0 | = | potencial de generación de metano, metros cúbicos por megagramo de desperdicio sólido |
| R | = | masa total de desperdicio sólido en una sección particular del SRS |
| k | = | constante de la razón de generación de metano, año ⁻¹ |

| | | |
|----------------------|---|---|
| t | = | edad del SRS, años |
| C_{CONM} | = | concentración de CONM, partes por millón por volumen como hexano |
| C | = | tiempo desde el cierre, años. Para SRS activos, $c=0$ y $e^{-kc}=1$ |
| 3.6×10^{-9} | = | factor de conversión |

Si el dueño u operador cumple con las disposiciones de documentación de la Regla 708 (d)(2), la masa del desperdicio sólido no-degradable puede restarse de la masa total de desperdicio sólido en una sección particular del SRS cuando se calcule el valor para R.

(b) Cálculos de Emisión-Tier 1

El dueño u operador comparará la tasa de emisión por masa del CONM calculada con la norma de 50 megagramos al año.

- (1) Si la tasa de emisión de CONM calculada es menor que 50 megagramos al año, el propietario del Sistema de Relleno Sanitario entonces someterá un informe de la tasa de emisión como provee la Regla 707 (b)(1), y recalculará anualmente la tasa de emisión de masa del CONM como se requiere bajo la Regla 702 (e).
- (2) Si la tasa de emisión de CONM calculada es igual o mayor que 50 megagramos al año, entonces el propietario del Sistema de Relleno Sanitario cumplirá con la Regla 702 (f), o determinará una concentración específica del lugar para CONM y recalculará la tasa de emisión del CONM usando los procedimientos provistos en la Regla 704 (c).

(c) Cálculos de Emisión - Tier 2

El dueño u operador del Sistema de Relleno Sanitario determinará concentración de CONM usando el siguiente procedimiento de muestreo. El dueño u operador del Sistema de Relleno Sanitario instalará por lo menos dos puntos de muestreo por hectárea de superficie del Sistema de Relleno Sanitario que haya retenido desperdicios sólidos por dos (2) años, por lo menos. Si el Sistema de Relleno Sanitario tiene un área mayor que 25 hectáreas se requieren únicamente 50 muestras. Los puntos de muestreo deberán evitar ubicarse en áreas conocidas donde hay desperdicios sólidos no-degradable. El dueño u operador recogerá y analizará una muestra del gas del Sistema de Relleno Sanitario desde cada punto de muestreo para

determinar la concentración de CONM mediante el uso del Método 25C o el Método 18 del Apéndice A del 40 CRF Parte 60, según incorporado en el apéndice de esta reglamentación. Si usa el Método 18, la lista mínima de compuestos para ser muestreadas serán los publicados en la Compilación de Factores de Emisión de Contaminantes de Aire (AP-42) más reciente. Si se usa la muestra compuesta, volúmenes iguales se tomarán desde cada punto de muestreo. Si se toma más del número requerido de muestras, todas las muestras se usarán en el análisis. El dueño u operador del Sistema de Relleno Sanitario dividirá la concentración de CONM por seis en el Método 25C del apéndice para convertir de C_{CONM} como carbono a C_{CONM} como hexano.

- (1) El dueño u operador del Sistema de Relleno Sanitario calculará de nuevo la tasa de emisión de masa de CONM usando las ecuaciones provistas en la Regla 704 (a) y usando la concentración promedio de CONM de las muestras tomadas en vez del valor de base de la ecuación provista en la Regla 704(a).
- (2) Si la tasa de emisión de masa calculada que resulte usando la concentración de CONM específica del sitio es igual o mayor que 50 megagramos al año, entonces el dueño u operador del Sistema de Relleno Sanitario cumplirá con la Regla 702(f) o determinará la constante de la tasa de generación de metano específica del sitio y calculará de nuevo la tasa de emisión de CONM usando la tasa de generación de metano específica del lugar usando el procedimiento especificado en la Regla 704(d).
- (3) Si la tasa de emisión de masa de CONM que resulte es menor que 50 megagramos al año, el dueño u operador someterá periódicamente un estimado del informe de la tasa de emisión provisto en la Regla 707 (b)(1) y muestreará de nuevo la concentración específica del sitio de CONM cada 5 años usando los métodos especificados en esta sección.

(d) Cálculos de Emisión - Tier 3

La constante de la tasa de generación de metano específica del lugar se determinará usando los procedimientos provistos en el Método 2E del Apéndice A del 40 CRF Parte 60, según incorporado en el apéndice de esta reglamentación. El dueño u operador del Sistema de Relleno Sanitario estimará la tasa de emisión de masa de CONM usando las ecuaciones de la Regla 704 (a) y usando k como la constante de la razón de generación de metano específica del sitio, y la concentración de CONM específica del sitio determinada en la Regla 704 (c) en vez de los valores de base provistos en la Regla 704 (a). El dueño u operador del Sistema de Relleno Sanitario comparará la tasa de emisión de masa de CONM resultante con la norma de 50 megagramos al año.

- (1) Si la tasa de emisión de masa de CONM calculada usando la razón de generación de metano específica del lugar y la concentración de CONM es igual o mayor que 50 megagramos al año, el dueño u operador cumplirá con la Regla 702(f).
- (2) Si la tasa de emisión de masa de CONM es menor que 50 megagramos al año, entonces el dueño u operador someterá un informe periódico sobre la tasa de emisión como provee el párrafo la Regla 707 (b)(1) y calculará anualmente la tasa de emisión de masa de CONM, como provee la Regla 707 (b)(1), usando las ecuaciones de la Regla de metano y 704 (a) y usando la constante de la razón de generación de metano específica del lugar y la concentración de CONM obtenida en la Regla 704 (c). El cálculo de la constante de la razón de generación de metano se realizará una vez, y el valor obtenido se usa subsiguientemente en todo cálculo anual de la tasa de emisión de CONM.

(e) Otros Métodos de Cálculos de Emisión

El dueño u operador puede usar otros métodos para determinar la concentración de CONM o la constante k específica del sitio como una alternativa a los métodos requeridos en la Regla 704 (c) y (d) siempre y cuando el método haya sido aprobado por APA como provee la Regla 702 (f)(1)(i)(B).

(f) Remoción del Equipo de Control

Luego de que un sistema de recolección y control esté instalado en cumplimiento con la Regla 705, el dueño u operador calculará la tasa de emisión de CONM usando la ecuación siguiente para propósitos de determinar cuando el sistema puede removerse como lo provee la Regla 702 (f)(4):

$$M_{\text{CONM}} = 1.89 \times 10^{-3} Q_{\text{LFG}} C_{\text{CONM}}$$

donde,

$$M_{\text{CONM}} = \text{tasa de emisión de masa de CONM, megagramos al año}$$

$$Q_{\text{LFG}} = \text{razón de flujo de gas del SRS, metros cúbicos por minuto}$$

$$C_{\text{CONM}} = \text{concentración de CONM, partes por millón por el volumen como hexano}$$

- (1) La razón de flujo de gas del Sistema de Relleno Sanitario, Q_{LFG} será

determinada midiendo la razón total de flujo de gas en el conducto común que conduce al instrumento de control usando un dispositivo calibrado para medir el flujo de gas según las disposiciones de la sección 4 del Método 2E del Apéndice A de la Parte 60 del 40 CRF y los apéndices de este Reglamento.

- (2) La concentración promedio del CONM, C_{CONM} , será determinada mediante la recolección y análisis del gas del Sistema de Relleno Sanitario, tomado del conducto común antes del equipo de remoción del condensado o impulsor del gas usando los procedimientos del Método 25C o el Método 18 del apéndice. Si usa el Método 18 del apéndice de este reglamento, la lista mínima de compuestos para ser muestreadas serán los publicados en la Compilación de Factores de Emisión de Contaminantes de Aire (AP-42) más reciente. El punto de muestreo en el conducto principal debe estar antes de cualquier unidad de remoción de condensado o de refinamiento de gases. El dueño u operador del Sistema de Relleno Sanitario dividirá la concentración del CONM por seis en el Método 25C para convertir de C_{CONM} como carbono a C_{CONM} como hexano.
- (3) El dueño u o el operador puede usar otro método para determinar razón de flujo del gas del Sistema de Relleno Sanitario y la concentración de CONM solo si el método ha sido aprobado por la APA previamente, como provee la Regla 702 (f)(1)(i)(B).

(g) Comparación de los Niveles de PDS (Prevención de Deterioro Significativo)

El dueño u operador de cada SRS Municipal sujeto a las disposiciones de esta Parte, estimará la tasa de emisión de CONM para la comparación con los niveles significativos y los niveles para fuente mayor de PDS, establecidos en la Sección 51.166 o 52.21 del 40 CRF y en los Apéndices de este Reglamento, usando la Compilación de Factores de Emisión de Contaminantes Atmosféricos (AP-42) de la Agencia Federal de Protección Ambiental o cualquier otro procedimiento de medición aprobado por la APA. Si se ha instalado un sistema de recolección, que cumple con las disposiciones de la Regla 702 (f), el dueño u operador estimará la tasa de emisión de CONM usando los procedimientos provistos en la Regla 704(f).

(h) Determinación de Cumplimiento

Para la prueba de funcionamiento requerida en la Regla 702 (f)(1)(v), se debe utilizar el Método 25 o Método 18 del Apéndice A del 40 CRF Parte 60 y los apéndices de este Reglamento para determinar cumplimiento con el 98 por ciento por peso de eficiencia o el 20 ppmv del nivel de concentración de salida, a menos que mediante otro método se demuestre cumplimiento y haya sido aprobado por APA según lo

provee la Regla 702 (f)(1)(i)(B). Si se utiliza el Método 18 del Apéndice A, la lista de compuestos mínimos para ser muestreados será la publicada en la más reciente Compilación de Factores de Emisión de Contaminantes de Aire (AP-42). Para calcular la eficiencia se utilizará la siguiente ecuación:

$$\text{Eficiencia de Control} = (\text{CONM}_{\text{en}} - \text{CONM}_{\text{fuera}}) / (\text{CONM}_{\text{en}})$$

donde,

CONM_{en} = masa de CONM entrando al dispositivo de control

$\text{CONM}_{\text{fuera}}$ = masa de CONM que sale del dispositivo de control

REGLA 705 DISPOSICIONES SOBRE CUMPLIMIENTO

(a) Métodos de Cumplimiento

Excepto lo provisto en la Regla 702(f)(1)(i)(B), los métodos especificados en la Regla 705 serán usados para determinar si el sistema de recolección y control de gases está en cumplimiento con la Regla 702 (f)(1)(iv).

(1) Para propósitos de calcular la razón de flujo de gases máxima esperada desde el Sistema de Relleno Sanitario para determinar cumplimiento con la Regla 702(f)(1)(iv)(A)(1), se usará una de las siguientes ecuaciones. Los factores cinéticos k y L_0 deberán ser los publicados en la más reciente Compilación de Factores de Emisión de Contaminante de Aire (AP-42) o cualquier otro valor específico del sitio que haya sido demostrado y aprobado por la APA. Si k se ha determinado como se especifica en la Regla 704 (d), se usará el valor de k determinado en la prueba. Un valor no mayor de 15 años se usará para el período de uso destinado del equipo movedor los gases. La vida activa del SRS es la edad del SRS más el número estimado de años hasta el cierre.

(i) Para lugares con una tasa desconocida de aceptación de desperdicios sólidos año-a-año:

$$Q_m = 2L_0 R (e^{-k_c} - e^{-kt})$$

donde,

Q_m = razón de flujo de generación de gases máxima esperada, metros cúbicos al año

- L_0 = potencial de generación de metano, metros cúbicos por megagramo de desperdicios sólidos
 R = tasa promedio anual de aceptación, megagramos al año
 k = constante de la razón de generación de metano, año⁻¹
 t = edad del SRS en la instalación de equipo más el tiempo que el propietario u operador destina usar el equipo móvil de gases o la vida útil del SRS, la que sea menor. Si el equipo se instala después del cierre, t es la edad del SRS en la instalación, años
 c = tiempo desde el cierre, años (para un SRS activo $c=0$ y $e^{-kc} = 1$)

(ii) Para sitios con una tasa de aceptación conocida de desperdicios sólidos:

$$Q_M = \sum_{i=1}^n 2kL_0 M_i (e^{-kc} i)$$

donde:

- Q_M = razón de flujo de generación de gases máxima esperada, metros cúbicos al año
 k = constante de la generación de metano, año⁻¹
 L_0 = potencial de generación de metano, metros cúbicos por megagramo de desperdicios sólidos
 M_i = masa de desperdicios sólidos en la sección i^{th} , megagramos
 t_i = edad de la sección i^{th} , años

(iii) Si un sistema de recolección y control ha sido instalado, los datos actuales de flujo pueden usarse para proyectar la razón de flujo de generación de gases máxima esperada en vez de o conjuntamente con las ecuaciones de la Regla 705 (a)(1)(i) y (a)(1)(ii). Si el Sistema de Relleno Sanitario todavía acepta desperdicios, los datos actuales del

flujo medido no igualarán la razón máxima esperada de generación de gases, tal que los cálculos que usan las ecuaciones de la Regla 705 (a)(1)(i) ó (a)(1)(ii) o los otros métodos se usarán para predecir la razón de generación de gases máxima esperada sobre el período destinado de uso del equipo de control de gases.

- (2) Para los propósitos de determinar la densidad suficiente de los recolectores de gases para el cumplimiento con la Regla 702 (f)(1)(iv)(A)(2), el dueño u operador diseñará un sistema de pozos verticales, recolectores horizontales, u otros dispositivos de recolección, a satisfacción de la Junta, capaces de controlar y extraer gases desde todas las porciones del Sistema de Relleno para alcanzar las normas operacionales y de funcionamiento.
- (3) Para los propósitos de demostrar si la razón de flujo del sistema de recolección y control de gases es suficiente para determinar cumplimiento con la Regla 702 (f)(1)(iv)(A)(3), el dueño u operador medirá mensualmente la presión en el conducto de recolección de gases a cada pozo individual. Si existe una presión positiva, la acción se iniciará para corregir los excesos dentro de 5 días consecutivos, a excepción de las tres de condiciones permitidas bajo la Regla 703 (a)(2). Si la presión negativa no puede lograrse sin excesiva filtración de aire dentro de 15 días consecutivos de la primera prueba, el sistema de recolección de gases deberá ser expandido para corregir las excedencias dentro de 120 días de la medida inicial de presión positiva. Cualquier medida correctiva intentada no debe ocasionar excedencias de otras normas operacionales o de funcionamiento.
- (4) Dueños u operadores no tendrán que instalar pozos adicionales como se requiere en la Regla 705 (a)(3) durante los primeros 180 días después de empezar a operar el sistema de recolección de gases.
- (5) Con el propósito de identificar si ocurre filtración excesiva de aire en el Sistema de Relleno Sanitario, el dueño u operador muestreará mensualmente la temperatura y nitrógeno o el oxígeno en cada pozo como requiere la Regla 703 (a)(3). Si un pozo excede, uno de estos parámetros operacionales se deben iniciar medidas dentro de 5 días de calendario para corregir los excesos. Si la corrección de los excesos no puede ser alcanzada dentro de 15 días calendario de la primera prueba, el sistema de recolección de gases se expandirá para corregir los excesos dentro de 120 días de exceso inicial. Cualquier medida correctiva intentada no debe ocasionar excedencias de otras normas operacionales o de funcionamiento.
- (6) Un dueño u operador que intenta demostrar cumplimiento con la Regla 702 (f)(1)(iv)(A)(4) mediante el uso de un sistema de recolección no conforme

con las especificaciones provistas en la Regla 709 proveerá información satisfactoria a la Junta como se especifica en la Regla 702 (f)(1)(i)(C) demostrando que la migración externa está siendo controlada.

(b) Métodos de Cumplimiento para Normas de Operación

Para propósitos de cumplimiento con la Regla 703 (a)(1), el dueño u operador de un Sistema de Relleno Sanitario controlado pondrá cada pozo o componente de diseño como se especifica en el plano de diseño aprobado según provisto en la Regla 702 (f)(1)(i). Se instalará cada pozo dentro de 60 días desde la fecha en que el desperdicio sólido inicial ha estado en el lugar por un período de:

- (1) 5 años o más si es activo; o
- (2) 2 años o más si está cerrado o en etapa final.

(c) Métodos de Cumplimiento para la Norma de Operación de Metano de Superficie

Los siguientes procedimientos se usarán para el cumplimiento con la norma operacional de metano superficial según se provee en la Regla 703 (a)(4).

- (1) Después de la instalación del sistema de recolección, el dueño u operador muestreará las concentraciones de metano superficial a lo largo del perímetro entero del área de recolección y a lo largo de un patrón tipo serpentina en espacios de 30 metros aparte (o en espacios específicos del lugar) para cada área de recolección sobre una base trimestral utilizando un analizador de vapor orgánico, detector de ionización de llama, u otro monitor portátil que llene las especificaciones provistas en la Regla 705 (d).
- (2) La concentración de trasfondo se determinará moviendo la entrada del sensor viento arriba y a favor del viento a una distancia de por lo menos 30 metros desde los pozos del perímetro y fuera del límite del Sistema de Relleno Sanitario.
- (3) El muestreo de la emisión de superficie se realizará conforme la sección 4.3.1 del Método 21 del Apéndice A del 40 CRF Parte 60, según incorporado en el apéndice de este reglamento, excepto que la entrada del sensor se pondrá dentro de 5 a 10 centímetros del terreno. El muestreo se realizará bajo condiciones meteorológicas típicas.
- (4) Una lectura de 500 partes por millón (ppm) o más sobre el trasfondo en

cualquier lugar se registrará como un exceso monitoreado y se tomarán las medidas aquí especificadas. Mientras se toman las medidas especificadas, el exceso no constituirá una violación de los requerimientos operacionales de la Regla 703 (a)(4).

- (i) La localización de cada exceso será anotada y registrada.
 - (ii) Los ajustes al vacío o el mantenimiento de la cubierta de los pozos adyacentes para aumentar la recolección de gases en la vecindad de cada exceso serán realizados y volverá a muestrearse el lugar dentro de 10 días consecutivos de detectarse un exceso.
 - (iii) Si la prueba se repite y muestra un segundo exceso, se tomará acción correctiva adicional y se muestreará nuevamente el lugar dentro de 10 días del segundo exceso.
 - (iv) Cualquier lugar que inicialmente mostró un exceso pero tiene una concentración de metano menor que 500 ppm sobre el valor de trasfondo a los 10 días de volver a muestrear, será monitoreado nuevamente luego del mes del exceso inicial. Si la muestra luego del mes refleja una concentración menor que 500 partes por millón sobre el trasfondo, no se requerirá ninguna verificación adicional de ese lugar hasta el próximo período trimestralmente. Si la muestra refleja un exceso, el dueño u operador deberá tomar las medidas especificadas en el próximo párrafo.
 - (v) Para cualquier lugar donde la concentración de metano monitoreado sea igual o excede las 500 partes por millón sobre el trasfondo en tres ocasiones dentro de un período trimestral, se instalará un nuevo pozo u otro dispositivo de recolección dentro de 120 días consecutivos del exceso inicial. Una alternativa remediativa al exceso, tal como mejorar el abanico, tubos principales o instrumentos de control y un itinerario de instalación correspondiente, puede someterse a la Junta para su aprobación y el lugar no tendrá que ser monitoreado hasta que la acción se realice.
- (5) El dueño u operador implementará un programa mensual para muestrear la integridad y reparar la cubierta mientras sea necesario.
- (d) Especificaciones de Instrumentación para el Estándar Operacional de Metano Superficial**

El dueño u operador que desee cumplir con los procedimientos del párrafo (c) de esta

Regla deberá cumplir con los siguientes procedimientos y especificaciones de instrumentación para los instrumentos que monitorean la emisión de superficie:

- (1) El analizador portátil deberá cumplir con las especificaciones instrumentales provistas en la sección 3 del Método 21 del apéndice de este reglamento, excepto que metano reemplaza todas las referencias a COV.
- (2) El gas de calibración será el metano, diluido a una concentración nominal de 500 partes por millón en aire.
- (3) Para alcanzar los requisitos de evaluación de funcionamiento en la sección 3.1.3 del Método 21 del apéndice de este reglamento, se usarán los procedimientos de evaluación del instrumento de la sección 4.4 de Método 21.
- (4) Los procedimientos de calibración provistos en la sección 4.2 del Método 21 se seguirán inmediatamente antes de comenzar un muestreo superficial de reconocimiento.

REGLA 706 MONITOREO DE OPERACIONES

(a) Monitoreo de Sistemas Activos de Recolección de Gases

Excepto lo provisto en la Regla 702 (f)(1)(i)(B), el dueño u operador que desee instalar un sistema de recolección y control de gases en cumplimiento con la Regla 702 (f)(1)(iv)(A) deberá instalar una portezuela para la ubicación del sistema de muestreo y un termopar u otro instrumento de medir temperatura en cada cabezal del pozo y:

- (1) Medir mensualmente la presión en el punto de recolección de gases según provista en la Regla 705 (a)(3); y
- (2) Monitorear mensualmente la concentración de oxígeno o nitrógeno en el gas del Sistema de Relleno Sanitario como provee la Regla 705 (a)(5); y
- (3) Monitorear mensualmente la temperatura del gas del Sistema de Relleno Sanitario como provee la Regla 705 (a)(5).

(b) Monitoreo para Cámara de Combustión Encerrada

Excepto lo provisto en el párrafo en la Regla 702 (f)(1)(i)(B), el dueño u operador que desee instalar una cámara de combustión encerrada como un sistema de control

en cumplimiento con la Regla 702(f)(2) deberá calibrar, mantener y operar el siguiente equipo según las especificaciones del fabricante.

- (1) Un instrumento para medir temperatura equipado con una grabadora continua y que tenga una certeza mínima de ± 1 por ciento de la temperatura medida expresado grados Celsius o ± 0.5 grados $^{\circ}\text{C}$, el que sea mayor. Un instrumento para medir temperatura no es requerido para calentadores de proceso o calderas que tengan la capacidad de diseño igual o mayor que 44 megavatios de calor introducido.
- (2) Un instrumento de medir la razón de flujo de gases que provea una medida de flujo de gases al instrumento de control o que evite al instrumento de control. El dueño u operador podrá:
 - (i) Instalar, calibrar y mantener un instrumento para medir la razón de flujo de gases que registrará el valor del flujo al instrumento de control por lo menos cada 15 minutos; o
 - (ii) Asegurar la válvula de la línea de desvío en la posición cerrada con una configuración tipo sello o de llave y candado. Se realizará una inspección visual del mecanismo de cierre o del sello por lo menos una vez al mes para asegurar que la válvula se mantiene en la posición cerrada y que el flujo de gases no es desviado a través de la línea de desvío.

(c) Monitoreo para antorchas

Excepto lo provisto en la Regla 702 (f)(1)(i)(B), el dueño u operador que desee instalar una antorcha como sistema de control en cumplimiento con la Regla 702 (f)(2) instalará, calibrará, mantendrá y operará el siguiente equipo según las especificaciones del fabricante:

- (1) Un instrumento o sensor de calor, tal como un sensor ultravioleta o termopar, en la luz piloto o en la flama para indicar la presencia continua de una flama.
- (2) Un instrumento que registre los flujos al o desvíe la flama. El dueño u operador deben al menos:
 - (i) Instalar, calibrar y mantener un instrumento de medir el flujo de gases que registre el flujo al instrumento de control por lo menos cada 15 minutos; o

- (ii) Asegurar la válvula de la línea de desvío en la posición cerrada con una configuración tipo sello o de llave y candado. Se realizará una inspección visual del mecanismo de cierre o del sello por lo menos una vez al mes para asegurar que la válvula se mantiene en la posición cerrada y que el flujo de gases no es desviado a través de la línea de desvío.

(d) Monitoreo para otros instrumentos de control

Excepto lo provisto en la Regla 702 (f)(1)(i)(B), el dueño u operador que desee instalar un instrumento distinto de una antorcha o de una cámara de combustión encerrada en cumplimiento con la Regla 702(f)(2) proveerá aquella información necesaria a la APA que describa la operación del instrumento de control, los parámetros operacionales que indicarán el funcionamiento apropiado y los procedimientos apropiados de muestreo. La APA puede especificar procedimientos de muestreo adicionales.

(e) Monitoreo para instrumentos de control que satisfacen otras especificaciones

Excepto lo provisto en la Regla 702 (f)(1)(i)(B), el dueño u operador que desee instalar un sistema de recolección y control que no llene las especificaciones de la Regla 709 o desee muestrear parámetros alternos a los requeridos por la Regla 703 hasta la Regla 706 proveerá información necesaria a la APA que describa el diseño y operación del sistema de recolección y control, los parámetros operacionales que indicarán el funcionamiento apropiado, y los procedimientos apropiados de muestreo. La APA puede especificar procedimientos de muestreo adicionales.

(f) Monitoreo para el Estándar Operacional de Metano Superficial

Excepto lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador que desee cumplir la Regla 705(c), muestreará las concentraciones de superficie de metano según los procedimientos y especificaciones del instrumento provistas en la Regla 705(d). Cualquier Sistema de Relleno Sanitario cerrado que no tenga excedencias de la norma operacional monitoreadas trimestralmente en tres períodos consecutivos puede optar por un muestreo anual. Cualquier lectura de metano que lea 500 ppm o mayor del nivel de trasfondo detectado durante el muestreo anual requerirá que la frecuencia para ese Sistema de Relleno Sanitario regrese al muestreo trimestral.

(a) Informe inicial de la capacidad de diseño

El dueño u operador de un Sistema de Relleno Sanitario sujeto a los requisitos de esta Parte deberá someter a la Junta un informe inicial de la capacidad de diseño, a excepción de lo provisto en la Regla 702(f)(1)(i)(B).

- (1) El informe inicial de la capacidad de diseño deberá ser sometido dentro de:
 - (i) 90 días después de la fecha de efectividad del Plan Federal para implantar las guías de emisión para los Sistemas de Relleno Sanitario.
- (2) El informe inicial de la capacidad de diseño deberá contener la siguiente información:
 - (i) Un mapa o plano del Sistema de Relleno Sanitario, proveyendo el tamaño y localización del Sistema de Relleno Sanitario, e identificando todas las áreas donde los desperdicios sólidos fueron depositados de acuerdo con las disposiciones del permiso de construcción o de operación de la Junta o RCRA.
 - (ii) La capacidad de diseño máxima del Sistema de Relleno Sanitario. Si la capacidad de diseño máxima está especificada en un permiso de construcción de la Junta o RCRA, entonces una copia de dicho permiso debe acompañar, y ser sometido como parte del informe. De lo contrario si no está especificado en el permiso, entonces la capacidad de diseño máxima debe ser calculada usando buenas prácticas de ingeniería. Los cálculos deber ser sometidos junto con otros parámetros como la profundidad del desperdicio sólido, la tasa de aceptación de desperdicios sólidos y prácticas de compactación, como parte del informe. La Junta podrá requerir otra información razonable, cuando sea necesario, para verificar la capacidad de diseño máxima del Sistema de Relleno Sanitario.
- (3) Un informe enmendado de la capacidad de diseño deberá ser sometido a la Junta para notificar de cualquier aumento en la capacidad de diseño del Sistema de Relleno Sanitario, siempre que el aumento resulte de un aumento en el área o profundidad permitida del Sistema de Relleno Sanitario, de un cambio en los procedimientos operacionales, o de cualquier otro medio que resulte en un aumento en la capacidad de diseño máxima del Sistema de Relleno Sanitario sobre 2.5 megagramos o 2.5 millones de metros cúbicos. El informe enmendado de la capacidad de diseño deberá ser sometido dentro

de 90 días del otorgamiento del permiso enmendado de construcción o de operación, o de la colocación de desperdicios en terreno adicional, o del cambio en los procedimientos operacionales que resulte en un aumento en la capacidad de diseño máxima, lo que ocurra primero.

(b) Informe de la Tasa de Emisión de CONM

A excepción de lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador sujeto a los requisitos de esta Parte deberá someter un informe de la tasa de emisión de CONM a la Junta inicialmente y luego anualmente, excepto como lo provisto en la Regla 707(b)(1)(ii) o (b)(3). La Junta podrá requerir información adicional, como sea necesario, para verificar la tasa de emisión de CONM informada.

- (1) El informe de la tasa de emisión de CONM deberá contener un estimado anual o de 5 años de la tasa de emisión de CONM calculada usando la fórmula y procedimientos provistos en la Regla 704(a) hasta la 704(f), según aplique.
 - (i) El informe de la tasa de emisión de CONM deberá someterse dentro de 90 días después de la fecha de efectividad del Plan Federal para implantar las Guías de Emisión para los Sistemas de Relleno Sanitario y puede ser combinado con el informe inicial de la capacidad de diseño requerido en la Regla 707(a). Informes subsecuentes de la tasa de emisión de CONM deberán ser sometidos anualmente, excepto como está provisto en la Regla 707(b)(1)(ii) y (b)(3).
 - (ii) Si la tasa de emisión de CONM, tal como se somete en el informe anual a la Junta, es menor que 50 megagramos por año en cada uno de los 5 años inmediatos consecutivos, el dueño u operador puede elegir someter un estimado de la tasa de emisión de CONM para el próximo período de 5 años en sustitución de un informe anual. El estimado deberá incluir la cantidad actual de desperdicio sólido depositado y la tasa de aceptación de desperdicio estimada para cada una de los 5 años en que se estimó la tasa de emisión de CONM. Todo los datos y cálculos en los cuales está basado el estimado deberá ser sometido a la Junta. Este estimado deberá ser revisado por lo menos una vez cada 5 años. Si la tasa de aceptación de desperdicio actual excede la tasa de aceptación de desperdicio estimado en cualquier año informado en el estimado de 5 años, un estimado de 5 años revisado deberá ser sometido a la Junta. El estimado revisado deberá cubrir el periodo de 5 años empezando con el año en el cual la tasa de aceptación de desperdicio actual excedió la tasa de

aceptación de desperdicio estimado.

- (2) El informe de la tasa de emisión de CONM deberá incluir todo los datos, cálculos, informe de muestra y medidas usadas para estimar las emisiones anuales o de cada 5 años.
- (3) Después de la instalación de un sistema de control y recolección en cumplimiento con la Regla 702(f), el dueño u operador sujeto a esta reglamentación está exento de los requisitos de la Regla 707(b)(1) y (2), mientras dicho sistema de recolección y control esté en operación y en cumplimiento con las Reglas 703 y 705.

(c) Informe de Diseño del Sistema de Recolección y Control

A excepción de lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador sujeto a las disposiciones la Regla 702(f)(1) deberá someter a la Junta un plan de diseño del sistema de recolección y control dentro de 1 año a partir del primer informe, requerido bajo la Regla 707(b), en el cual la tasa de emisión es igual o excede de 50 megagramos por año, excepto lo siguiente:

- (1) Si el dueño u operador elige recalcular la tasa de emisión del CONM posterior al muestreo y análisis del Tier 2 como lo dispone la Regla 704(c) y la tasa resultante es menor que 50 megagramos por año, un informe anual periódico deberá reanudarse usando la concentración de CONM específica determinada en el Tier 2, hasta que la tasa de emisión calculada sea igual o mayor que 50 megagramos por año o que el Sistema de Relleno Sanitario sea cerrado. El informe de emisión de CONM revisado, junto con la tasa de emisión recalculada basada en muestreo y análisis de CONM, deberá ser sometido dentro de los 180 días siguientes a la primera excedencia calculada de 50 megagramos por año.
- (2) Si el dueño u operador elige recalcular las emisiones de CONM después de determinar la constante (k) de generación de metano, como lo dispone el Tier 3 en la Regla 704(d), y la emisión de CONM resultante es menor que 50 Mg/año, los informes periódicos anuales deberán ser reanudados. La constante (k) de generación de metano resultante deberá ser usada en los cálculos de emisión hasta que las emisiones calculadas resulten en una excedencia. El informe de la tasa de emisión de CONM revisado, basado en las disposiciones de la Regla 704(d) y la constante (k) de generación de metano resultante, deberá ser sometido a la Junta dentro de 1 año después de que la primera tasa de emisión calculada sea igual o exceda de 50 megagramos por año.

(d) Informe de clausura

A excepción de lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un Sistema de Relleno Sanitario controlado deberá someter a la Junta un informe de clausura dentro de 30 días después de cesar la aceptación de desperdicios. La Junta podrá requerir información adicional, como sea necesario, para verificar que la clausura permanente ha ocurrido de acuerdo con los requisitos establecidos en la Sección 258.60 del 40 CRF. Si un informe de clausura ha sido sometido a la Junta, ningún desperdicio adicional puede ser depositado en el Sistema de Relleno Sanitario sin someter una notificación de modificación como se describe bajo la Sección 60.7(a)(4) del 40 CRF y contenida en los Apéndices de este Reglamento.

(e) Informe de Remoción de Equipo

Excepto como está provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un Sistema de Relleno Sanitario controlado deberá someter a la Junta un informe de remoción de equipo 30 días antes de la remoción o cesación de operación del equipo de control.

(1) El informe de remoción de equipo deberá contener todo lo siguiente:

- (i) Copia del informe de clausura sometido de acuerdo con la Regla 707(d);
- (ii) Copia del informe de la prueba de funcionamiento demostrando que el periodo de control mínimo de 15 años ha expirado; y
- (iii) Copias con fechas de tres informes sucesivos de emisión de CONM demostrando que el Sistema de Relleno Sanitario no está produciendo 50 megagramos o más por año de CONM.

(2) La Junta podrá requerir información adicional, como sea necesario, para verificar que todas las condiciones para la remoción han sido cumplidas como requiere la Regla 702(f)(4).

(f) Informes Anuales

Excepto como esté provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un Sistema de Relleno Sanitario que desea cumplir con la Regla 702(f) usando un sistema de recolección activo diseñado de acuerdo con la Regla 702(f)(1)(iv) deberá someter a la Junta informes anuales de la información registrado en (f)(1) hasta (f)(6) en este párrafo. El informe anual inicial deberá ser sometido dentro de 180 días de la instalación y comienzo de operaciones del sistema de recolección y control, y

deberá incluir el informe inicial de la prueba de funcionamiento requerido bajo la Sección 60.8 del 40 CRF. Para las cámaras de combustión encerrada y antorchas, las excedencias que se deben informar están definidas bajo la Regla 708(c).

- (1) El valor y tiempo de duración de los parámetros aplicables monitoreados en caso de excedencia bajo la Regla 706(a), (b), (c) y (d).
- (2) La descripción y duración de todos los períodos cuando el flujo del gas es desviado del instrumento de control hacia una válvula auxiliar o la indicación del flujo a través de una válvula auxiliar como se especifica bajo la Regla 706.
- (3) La descripción y duración de todos los períodos cuando el instrumento de control estuvo fuera de operación por más de 1 hora y tiempo total que estuvo fuera de servicio.
- (4) Todos los períodos cuando el sistema de recolección estuvo fuera de operación en exceso de 5 días.
- (5) La localización de cada excedencia de la concentración de metano sobre 500 ppm como se dispone en la Regla 703(a)(4) y la concentración registrada en cada localización donde hubo excedencias registrada durante el mes anterior.
- (6) La fecha de instalación y la localización de cada pozo o expansión añadida al sistema recolección conforme a la Regla 705(a)(3), (b) y (c)(4).

(g) Informe Inicial sobre la Prueba de Funcionamiento

Excepto como provisto en la Regla 702(f)(1)(i)(B), el dueño u operador que desea cumplir con la Regla 702(f)(1)(i) deberá incluir, junto con el informe inicial de la prueba de funcionamiento requerida en la Sección 60.8 del 40 CRF e incluida en los Apéndices de este Reglamento, la siguiente información:

- (1) Un diagrama del sistema de recolección y control demostrando la posición exacta del sistema de recolección incluyendo todos los pozos, colectores horizontales, colectores superficiales, o cualquier otro instrumento de extracción incluyendo la localización de cualquier área excluida y las áreas propuestas para la expansión futura del sistema de recolección;
- (2) Los datos en los cuales está basada la densidad suficiente y las dimensiones de los pozos, colectores horizontales, colectores de superficiales, o cualquier otro instrumento de extracción y el equipo movedor de gas;

- (3) Documentación de la presencia de asbestos o material no degradable para cada área en la que se excluyeron los pozos de recolección basado en la presencia de asbestos o material no degradable;
- (4) La suma de las tasas de generación de gas para todas las áreas donde se excluyeron pozos de recolección basado en no productividad y los cálculos de la razón de generación de gas para cada área excluida;
- (5) Las medidas tomadas para aumentar la capacidad del equipo movedor de gas con respecto al aumento de generación de gas, si el equipo movedor de gas presente es inadecuado para mover el flujo máximo esperado durante la vida útil del Sistema de Relleno Sanitario; y
- (6) Las medidas tomadas para controlar la migración del gas fuera del Sistema de Relleno Sanitario.

(h) Otros Informes

Todos los SRS que se les requiere cumplir con la Regla 702(f) deberán informar a la Junta sus logros para el cumplimiento con los incrementos de progreso dentro de 60 días después de lograr cada uno de los incrementos de progreso del itinerario de cumplimiento.

REGLA 708 MANTENIMIENTO DE EXPEDIENTES

(a) Expedientes de Capacidad de Diseño

Excepto lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un SRS Municipal, sujeto a las disposiciones de la Regla 702(d), mantendrá accesible y guardará por lo menos 5 años hasta el presente, los expedientes de la capacidad máxima de diseño, la cantidad actual de desperdicios sólidos en el lugar y la tasa año-a-año de aceptación. Los expedientes de lugares externos pueden mantenerse si ellos son recuperables dentro de 4 horas. Copiar en papel o los formatos electrónicos son aceptables.

(b) Expedientes de los Equipos de Control

Excepto lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un Sistema de Relleno Sanitario controlado archivará los expedientes actualizados, fácilmente accesibles durante la vida del equipo de control, los antecedentes enumerado en la Regla 708(b) según medido durante la prueba inicial de cumplimiento o la

determinación de cumplimiento. Los registros de monitoria o pruebas subsecuentes se mantendrán por un mínimo de 5 años. Los registros de las especificaciones del vendedor del equipo de control se mantendrán hasta la remoción.

- (1) Si un dueño u operador de un SRS Municipal busca demostrar cumplimiento con la Regla 702(f)(1)(iv) deberá archivar:
 - (i) La razón máxima esperada de la generación de corriente de gas según calculada en la Regla 705(a)(1). El dueño u operador puede usar otro método para determinar la generación máxima de gas si el método ha sido aprobado por la APA.
 - (ii) La densidad de los pozos, recolectores horizontales, recolectores de superficie, o cualquier otro equipo de extracción de gas determinado usando los procedimientos especificados en la Regla 709(a)(1).
- (2) Si un dueño u operador de un SRS Municipal busca demostrar cumplimiento con la Regla 702(f)(2) mediante el uso de un equipo de combustión encerrada, a excepción de un calentador de proceso o caldera, con una capacidad de consumo de calor de diseño igual o mayor que 44 megavatios deberá archivar:
 - (i) La temperatura promedio de combustión medida por lo menos cada 15 minutos y promediada sobre el mismo período de tiempo de la prueba de cumplimiento.
 - (ii) El porcentaje de reducción de CONM determinado como se especifica en la Regla 702(f)(2)(ii) y (f)(2)(iii) alcanzado por el equipo de control.
- (3) Cuando un dueño u operador de un SRS Municipal, busca demostrar cumplimiento con la Regla 702(f)(2)(iii)(A) mediante el uso de un calentador de proceso o caldera de cualquier tamaño, deberá registrar una descripción de la localización en donde se introduce la ventilación de la corriente de gas colectado en el calentador de proceso o caldera en el mismo período de tiempo de la prueba de cumplimiento.
- (4) Cuando un dueño u operador de un SRS Municipal busca demostrar cumplimiento con la Regla 702(f)(2)(i) mediante el uso de una antorcha, el tipo de antorcha (es decir, asistida con vapor, asistida con aire, o no-asistida) deberá archivar todas las lecturas de emisión visibles, determinación de contenido de calor, las medidas de la razón de flujo del desvío o la razón de flujo, y las determinaciones de velocidad de salida realizadas durante las

pruebas de cumplimiento según se especifica en la sección 60.18 del 40 CRF, según incorporada en el apéndice de este reglamento; los registros continuos de la llamada piloto o los registros y la verificación de la llama de la antorcha de todos los periodos de operaciones donde la llama de piloto de la antorcha está ausente.

(c) Expedientes de los parámetros operacionales del Equipo

Excepto lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un Sistema de Relleno Sanitario controlado sujeto a las disposiciones de esta Parte guardará actualizados y accesibles por 5 años los registros de los parámetros operacionales del equipo especificados para ser monitoreados según la Regla 706 así como también los registros, accesibles para lectura de los periodos de operación donde los límites del parámetro establecidos durante la prueba de cumplimiento más reciente se exceden.

- (1) Se consideran excedencias a ser archivadas e informadas bajo la Regla 707(f) a las siguientes:
 - (i) Para combustión enclaustrada, excepto las calderas y calentadores de proceso con la capacidad de diseño de insumo de calor de 44 megavatios (150 millones de unidad térmica británica por hora (Btu)) o mayor, todos los periodos de operación de 3-horas durante los cuales, la temperatura promedio de combustión era más de 28 °C por debajo de la temperatura promedio de combustión durante prueba de cumplimiento más reciente que se determinó cumplimiento con la Regla 702(f)(2).
 - (ii) Para calderas o los calentadores de proceso, cuando hay un cambio en la localización donde se introduce la corriente ventilada en la zona de llama según requerido por la Regla 708(b)(3).
- (2) El dueño u operador de un SRS Municipal guardará registros continuos accesibles de fácil lectura del indicio de corriente al equipo de control o el indicio del flujo del desvío o los expedientes de las inspecciones mensuales de las configuraciones tipo candado-llave o sistemas de seguridad usados para sellar las líneas de las líneas del desvío especificadas bajo la Regla 706.
- (3) Cada dueño u operador de un SRS Municipal que usa un calentador de proceso o caldera con una capacidad de insumo de calor de diseño de 44 megavatios o mayor para cumplir con la Regla 702(f)(2) deberá guardar el expediente accesible de fácil lectura de todos los periodos de operación del calentador de proceso o caldera. (Los ejemplos de tales registros podrían incluir los registros de uso de vapor, uso de combustible, o los datos de

muestreo recogidos debido a otro requisito de la Junta o requisitos reglamentarios federales.)

- (4) El dueño u operador que busca cumplir con esta reglamentación mediante el uso de una antorcha abierta guardará los registros continuos de monitoria, accesibles y de fácil lectura, de la llama del piloto de la antorcha o de la llama controlada especificados bajo la Regla 706(c), y los registros accesibles actualizados de todos los períodos de operación en que la llama de piloto de la antorcha o la llama está ausente.

(d) Otros Expedientes

Excepto lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un SRS Municipal mantendrá durante la vida del sistema de recolección un mapa de sitio actualizado, accesible para lectura, que muestre cada recolector existente y planificado en el sistema y provea un rótulo de identificación único de la localización de cada recolector.

- (1) El dueño u operador de un SRS Municipal guardará los registros accesibles de la fecha de instalación y localización de todos los recolectores nuevos instalados como se especifica en la Regla 705(b).
- (2) El dueño u operador de un SRS Municipal guardará documentación fácilmente accesible de la naturaleza, fecha de disposición, cantidad, y la localización de material que contenga asbesto o del desperdicio no-degradable que se excluyó de la recolección según provee la Regla 709(a)(3)(i) así como también cualquier área no-productiva excluida para recolección como provee la Regla 709(a)(3)(ii).

(e) Expedientes de Excedencia de Normas Operacionales

Excepto lo provisto en la Regla 702(f)(1)(i)(B), el dueño u operador de un SRS Municipal guardará actualizados, por lo menos durante 5 años, los registros accesibles de toda excedencia de los patrones operacionales del sistema de control y recolección de la Regla 703, la lectura en el mes subsecuente independiente que la segunda lectura sea una excedencia o no, y la localización de cada excedencia.

REGLA 709 ESPECIFICACIONES PARA LOS SISTEMAS ACTIVOS DE RECOLECCION

(a) Ubicación de los Sistemas Activos de Recolección

El dueño u operador que busca cumplir con la Regla 702(f)(1)(i) deberá ubicar pozos activos de recolección, recolectores horizontales, recolectores de superficie, o los otros equipos de extracción a una Densidad Suficiente a lo largo de toda área que produce gas usando los siguientes procedimientos, a menos que, los procedimientos alternos hayan sido aprobados por la Junta y la APA como provee la Regla 702(f)(1)(i)(C) y (f)(1)(i)(D):

- (1) Los equipos de recolección dentro del interior y a lo largo de las áreas del perímetro serán certificadas para lograr control comprensivo de emisiones de gas de superficie, por un ingeniero profesional. Los siguientes tópicos deben incluirse en el diseño: la profundidad de desecho, tasa de generación de gas desecho y características de flujo, propiedades de la cubierta, capacidad de expansión del sistema de gas, manejo del lixiviado y el condensado, accesibilidad, compatibilidad con las operaciones de relleno, integración con el uso final de cierre, control de intrusión de aire, resistencia a corrosión, arreglo de relleno, y la resistencia a la descomposición por calor desechado.
- (2) La Densidad Suficiente de los equipos de recolección de gas determinados en la Regla 709(a)(1), deberá señalar los aspectos de la migración de gas del Sistema de Relleno Sanitario y el aumento del sistema de recolección mediante el uso de sistemas activos o pasivos en el exterior o perímetro del Sistema de Relleno Sanitario.
- (3) La colocación de los equipos de recolección de gas determinados en la Regla 709(a)(1) deberá controlar todo el gas que producen las áreas, excepto lo provisto en la Regla 709(a)(3)(i) y (a)(3)(ii).
 - (i) Cualquier área segregada de material que contenga asbesto o desperdicio no-degradable puede excluirse de la recolección si se documenta como provee la Regla 708(d). La documentación proveerá la naturaleza, la fecha de disposición, localización y la cantidad de material que contiene asbesto o desperdicio no-degradable depositado en el área, y se proveerá a la Junta luego de ser solicitado.
 - (ii) Cualquier área no-productiva del Sistema de Relleno Sanitario puede excluirse del control, con tal que el total de todas las áreas excluidas puede demostrarse que contribuyen menos de 1 por ciento del total de

las emisiones del CONM desde el Sistema de Relleno Sanitario. La cantidad, la localización, y la edad del material se documentará y se proveerá a la Junta luego de ser solicitado. Un estimado de las emisiones de CONM, por separado, para cada sección propuesta para la exclusión, y la suma de todas las secciones se comparará con el estimado total de emisiones de CONM para el Sistema de Relleno Sanitario entero. Las emisiones de cada sección se computarán usando la siguiente ecuación:

$$Q_i = 2 k L_o M_i (e^{-kt} i) (C_{\text{CONM}}) (3.6 \times 10^{-9})$$

donde,

| | | |
|----------------------|---|---|
| Q_i | = | CONM de emisión tasa desde la sección i^{th} , megagramos al año |
| k | = | constante de la razón de generación de metano, año ⁻¹ |
| L_o | = | generación potencial de etano, metros cúbicos por megagramo de desperdicios sólidos |
| M_i | = | masa del desperdicio sólido degradable en la sección i^{th} , megagramo |
| t_i | = | edad del desperdicio sólido en la sección i^{th} , años |
| C_{CONM} | = | concentración de compuestos orgánicos no-metano (CONM), partes por millón por volumen |
| 3.6×10^{-9} | = | factor de conversión |

- (iii) Los valores para k , L_o , y C_{CONM} determinados en la prueba de campo se usará, si la prueba de campo ha sido realizada para determinar la tasa de emisión del CONM o el radio de influencia. Si la prueba de campo no se ha realizado, se usará el valor base para k , L_o y el C_{CONM} provisto en la Regla 704(a). La masa del desperdicio sólido no-degradable contenido dentro de la sección determinada puede restarse de la masa total de la sección cuando se estimen las emisiones proveyendo que la naturaleza, localización, edad y la cantidad del material no-degradable se documentará según lo provisto en la Regla 709(a)(3)(i).

(b) Construcción de Equipos de Recolección de Gas

El dueño u operador que busca cumplir con la Regla 702(f)(1)(i)(A) construirá los equipos de recolección de gas usando los siguientes equipos o procedimientos:

- (1) Los componentes de extracción de gas del Sistema de Relleno Sanitario se construirán de cloruro de polivinilo (PVC, en inglés), tubo de polietileno de alta densidad (HDPE, en inglés), fibras de vidrio, acero inoxidable, u otro material no-poroso resistente a corrosión con dimensiones apropiadas para: transferir cantidades proyectadas de gases; resistente a instalación, estática y fuerzas de estabilización; y resistente a sobrecargar o cargas planificadas. El sistema de recolección se extenderá cuanto sea necesario para cumplir con los estándares de migración y emisión. Los equipos de recolección tales como pozos y los recolectores horizontales serán perforados para permitir la entrada de gas sin la pérdida de carga suficiente que impida el cumplimiento a través de la extensión del control. Las perforaciones se situarán para impedir filtración excesiva de aire según sea necesario.
- (2) Los pozos verticales se pondrán, de forma tal, que no pongan en peligro las coberturas básicas e identificarán la presencia de agua del Sistema de Relleno Sanitario. Los hoyos y los fosos construidos para pozos entubados y los recolectores horizontales serán de suficientes espesor seccional para permitir la construcción y terminación incluyendo, por ejemplo, la centralización de tubos y colocación de relleno de gravilla. Los equipos de recolección se diseñarán de manera que no permita cortes en la circulación del aire en la cubierta o desecho en el sistema de recolección o gas al aire. Cualquier gravilla usada alrededor las perforaciones de tubo deberían ser de una dimensión para no penetrar o perforar en bloque.
- (3) Los equipos de recolección pueden conectarse a la cabecera de recolección en tubo debajo o sobre la superficie del Sistema de Relleno Sanitario. El ensamblaje del conector incluirá una válvula de gollete (*throttle*, en inglés) de cierre, cualquier conector y sello necesario, conectores de acceso y al menos un una portezuela de muestreo. Los equipos de recolección se construirán PVC, HDPE, fibras de vidrio, acero inoxidable u otro material no-poroso de espesor razonable.

(c) Transporte de Gas de Sistema de Relleno Sanitario

El dueño u operador, que intente cumplir con la Regla 702(f)(1)(i)(A), tendrá que transportar el gas de SRS al sistema de control en conformidad con la Regla 702(f)(2) mediante la cabecera entubada de recolección. El equipo motriz de gas tendrá un tamaño capaz de manejar la razón de generación de gas máxima esperada sobre que

el período de uso del equipo motriz de gas usando los siguientes procedimientos:

- (1) Para sistemas existentes de recolección, los datos de flujo se usarán para proyectar la tasa de corriente máxima. Si no existen datos de flujo, se deberán usar los procedimientos de la Regla 709(c)(2).
- (2) Para los sistemas de recolección nuevos, la tasa máxima de corriente será la que establece la Regla 705(a)(1).

REGLA 710 PENALIDAD POR INCUMPLIMIENTO

El incumplimiento con cualesquiera de los requisitos establecidos en esta Parte constituirá una violación y el dueño de un SRS Municipal estará sujeto a una orden administrativa de cumplimiento y/o sujeto a una penalidad administrativa. Las penalidades serán impuestas de acuerdo con la Ley sobre Política Pública Ambiental, Ley Núm. 9 del 18 de junio de 1970, según enmendada, y cualquier otra reglamentación creada a su amparo.

APÉNDICES

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| Pollutant. | Annual | Averaging time (hours) | | | |
|------------------------|-----------------------------|---------------------------|-----------------------------|----------------------------|---------------------------|
| | | 24 | 8 | 3 | 1 |
| SO ₂ | 1.0 µg/m ³ | 5 µg/m ³ | | 25 µg/m ³ | |
| PM ₁₀ | 1.0 µg/m ³ | 5 µg/m ³ | | | |
| NO ₂ | 1.0 µg/m ³ | | | | |
| CO | | | 0.5 mg/m ³ | | 2 mg/m ³ |

(3) Such a program may include a provision which allows a proposed major source or major modification subject to paragraph (b) of this section to reduce the impact of its emissions upon air quality by obtaining sufficient emission reductions to, at a minimum, compensate for its adverse ambient impact where the major source or major modification would otherwise cause or contribute to a violation of any national ambient air quality standard. The plan shall require that, in the absence of such emission reductions, the State or local agency shall deny the proposed construction.

(4) The requirements of paragraph (b) of this section shall not apply to a major stationary source or major modification with respect to a particular pollutant if the owner or operator demonstrates that, as to that pollutant, the source or modification is located in an area designated as nonattainment pursuant to section 107 of the Act.

[51 FR 40669, Nov. 7, 1986, as amended at 52 FR 24713, July 1, 1987; 52 FR 29386, Aug 7, 1987; 54 FR 27285, 27299 June 28, 1989; 57 FR 3946, Feb. 3, 1992; 57 FR 32334, July 21, 1992]

§ 51.166 Prevention of significant deterioration of air quality.

(a)(1) *Plan requirements.* In accordance with the policy of section 101(b)(1) of the act and the purposes of section 160 of the Act, each applicable State implementation plan shall contain emission limitations and such other measures as may be necessary to prevent significant deterioration of air quality.

(2) *Plan revisions.* If a State Implementation Plan revision would result in increased air quality deterioration over any baseline concentration, the plan revision shall include a demonstration that it will not cause or contribute to a violation of the applicable increment(s). If a plan revision proposing less restrictive requirements was submitted after August 7, 1977 but on or before any applicable baseline date and was pending action by the Administrator on that date, no such demonstration is necessary with respect to the area for which a baseline date would be established before final action is taken on the plan revision. Instead, the assessment described in paragraph (a)(4) of this section,

shall review the expected impact to the applicable increment(s).

(3) *Required plan revision.* If the State or the Administrator determines that a plan is substantially inadequate to prevent significant deterioration or that an applicable increment is being violated, the plan shall be revised to correct the inadequacy or the violation. The plan shall be revised within 60 days of such a finding by a State or within 60 days following notification by the Administrator, or by such later date as prescribed by the Administrator after consultation with the State.

(4) *Plan assessment.* The State shall review the adequacy of a plan on a periodic basis and within 60 days of such time as information becomes available that an applicable increment is being violated.

(5) *Public participation.* Any State action taken under this paragraph shall be subject to the opportunity for public hearing in accordance with procedures equivalent to those established in § 51.102.

(6) *Amendments.* (i) Any State required to revise its implementation plan by reason of an amendment to this section, including any amendment adopted simultaneously with this paragraph, shall adopt and submit such plan revision to the Administrator for approval within 9 months after the effective date of the new amendments.

(ii) Any revision to an implementation plan that would amend the provisions for the prevention of significant air quality deterioration in the plan shall specify when and as to what sources and modifications the revision is to take effect.

(iii) Any revision to an implementation plan that an amendment to this section required shall take effect no later than the date of its approval and may operate prospectively.

(b) *Definitions.* All state plans shall use the following definitions for the purposes of this section. Deviations from the following wording will be approved only if the state specifically demonstrates that the submitted definition is more stringent, or at least as stringent, in all respects as the corresponding definitions below:

(1)(i) *Major stationary source* means:

(a) Any of the following stationary sources of air pollutants which emits, or has the potential to emit, 100 tons per year or more of any pollutant

subject to regulation under the Act: Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants, and charcoal production plants;

(b) Notwithstanding the stationary source size specified in paragraph (b)(1)(i)(a) of this section, any stationary source which emits, or has the potential to emit, 250 tons per year or more of any air pollutant subject to regulation under the Act; or

(c) Any physical change that would occur at a stationary source not otherwise qualifying under paragraph (b)(1) of this section, as a major stationary source if the change would constitute a major stationary source by itself.

(ii) A major source that is major for volatile organic compounds shall be considered major for ozone.

(iii) The fugitive emissions of a stationary source shall not be included in determining for any of the purposes of this section whether it is a major stationary source, unless the source belongs to one of the following categories of stationary sources:

- (a) Coal cleaning plants (with thermal dryers);
- (b) Kraft pulp mills;
- (c) Portland cement plants;
- (d) Primary zinc smelters;
- (e) Iron and steel mills;
- (f) Primary aluminum ore reduction plants;
- (g) Primary copper smelters;
- (h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
- (i) Hydrofluoric, sulfuric, or nitric acid plants;
- (j) Petroleum refineries;
- (k) Lime plants;
- (l) Phosphate rock processing plants;
- (m) Coke oven batteries;
- (n) Sulfur recovery plants;
- (o) Carbon black plants (furnace process);
- (p) Primary lead smelters;
- (q) Fuel conversion plants;

- (r) Sintering plants;
- (s) Secondary metal production plants;
- (t) Chemical process plants;
- (u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
- (v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
- (w) Taconite ore processing plants;
- (x) Glass fiber processing plants;
- (y) Charcoal production plants;
- (z) Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input;
- (aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

(2)(i) *Major modification* means any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act.

(ii) Any net emissions increase that is significant for volatile organic compounds shall be considered significant for ozone.

(iii) A physical change or change in the method of operation shall not include:

- (a) Routine maintenance, repair, and replacement;
- (b) Use of an alternative fuel or raw material by reason of any order under section 2 (a) and (b) of the Energy Supply and Environmental Coordination Act of 1974 (or any superseding legislation) or by reason of a natural gas curtailment plan pursuant to the Federal Power Act;
- (c) Use of an alternative fuel by reason of an order or rule under section 125 of the Act;
- (d) Use of an alternative fuel at a steam generating unit to the extent that the fuel is generated from municipal solid waste;
- (e) Use of an alternative fuel or raw material by a stationary source which:

(1) The source was capable of accommodating before January 6, 1975, unless such change would be prohibited under any federally enforceable permit condition which was established after January 6, 1975 pursuant to 40 CFR 52.21 or under regulations approved pursuant to 40 CFR subpart I or § 51.166; or

(2) The source is approved to use under any permit issued under 40 CFR 52.21 or under regulations approved pursuant to 40 CFR 51.166;

(f) An increase in the hours of operation or in the production rate, unless such change would be prohibited under any federally enforceable permit condition which was established after January 6, 1975, pursuant to 40 CFR 52.21 or under regulations approved pursuant to 40 CFR subpart I or § 51.166.

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(g) Any change in ownership at a stationary source.

(h) The addition, replacement or use of a pollution control project at an existing electric utility steam generating unit, unless the Administrator determines that such addition, replacement, or use renders the unit less environmentally beneficial, or except:

(1) When the reviewing authority has reason to believe that the pollution control project would result in a significant net increase in representative actual annual emissions of any criteria pollutant over levels used for that source in the most recent air quality impact analysis in the area conducted for the purpose of title 1, if any, and

(2) The reviewing authority determines that the increase will cause or contribute to a violation of any national ambient air quality standard or PSD increment, or visibility limitation.

(i) The installation, operation, cessation, or removal of a temporary clean coal technology demonstration project, provided that the project complies with:

(1) The State implementation plan for the State in which the project is located; and

(2) Other requirements necessary to attain and maintain the national ambient air quality standards during the project and after it is terminated.

(j) The installation or operation of a permanent clean coal technology demonstration project that constitutes repowering, provided that the project does not result in an increase in the potential to emit of any regulated pollutant emitted by the unit. This exemption shall apply on a pollutant-by-pollutant basis.

(k) The reactivation of a very clean coal-fired electric utility steam generating unit.

(3)(i) *Net emissions increase* means the amount by which the sum of the following exceeds zero:

(a) Any increase in actual emissions from a particular physical change or change in the method of operation at a stationary source; and

(b) Any other increases and decreases in actual emissions at the source that are contemporaneous with the particular change and are otherwise creditable.

(ii) An increase or decrease in actual emissions is contemporaneous with the increase from the particular change only if it occurs within a reasonable period (to be specified by the state) before the date that the increase from the particular change occurs.

(iii) An increase or decrease in actual emissions is creditable only if the reviewing authority has not relied on it in issuing a permit for the source under regulations approved pursuant to this section, which permit is in effect when the increase in actual emissions from the particular change occurs.

(iv) An increase or decrease in actual emissions of sulfur dioxide, particulate matter, or nitrogen oxides, which occurs before the applicable minor source baseline date is creditable only if it is required to be considered in calculating the amount of maximum allowable increases remaining available. With respect to particulate matter, only PM-10 emissions can be used to evaluate the net emissions increase for PM-10.

(v) An increase in actual emissions is creditable only to the extent that the new level of actual emissions exceeds the old level.

(vi) A decrease in actual emissions is creditable only to the extent that:

(a) The old level of actual emissions or the old level of allowable emissions, whichever is lower, exceeds the new level of actual emissions;

(b) It is federally enforceable at and after the time that actual construction on the particular change begins; and

(c) It has approximately the same qualitative significance for public health and welfare as that attributed to the increase from the particular change.

(vii) An increase that results from a physical change at a source occurs when the emissions unit on which construction occurred becomes operational and begins to emit a particular pollutant. Any replacement unit that requires shakedown becomes operational only after a reasonable shakedown period, not to exceed 180 days.

(4) *Potential to emit* means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source.

(5) *Stationary source* means any building, structure, facility, or installation which emits or may emit any air pollutant subject to regulation under the Act.

(6) *Building, structure, facility, or installation* means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control) except the activities of any vessel. Pollutant-emitting activities shall be considered as part of the same industrial grouping if they belong to the same *Major Group* (i.e., which have the same two-digit code) as described in the *Standard Industrial Classification Manual, 1972*, as amended by the 1977 Supple-

ment (U.S. Government Printing Office stock numbers 4101-0066 and 003-005-00176-0, respectively).

(7) *Emissions unit* means any part of a stationary source which emits or would have the potential to emit any pollutant subject to regulation under the Act.

(8) *Construction* means any physical change or change in the method of operation (including fabrication, erection, installation, demolition, or modification of an emissions unit) which would result in a change in actual emissions.

(9) *Commence* as applied to construction of a major stationary source or major modification means that the owner or operator has all necessary preconstruction approvals or permits and either has:

(i) Begun, or caused to begin, a continuous program of actual on-site construction of the source, to be completed within a reasonable time; or

(ii) Entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the owner or operator, to undertake a program of actual construction of the source to be completed within a reasonable time.

(10) *Necessary preconstruction approvals or permits* means those permits or approvals required under federal air quality control laws and regulations and those air quality control laws and regulations which are part of the applicable State Implementation Plan.

(11) *Begin actual construction* means, in general, initiation of physical on-site construction activities on an emissions unit which are of a permanent nature. Such activities include, but are not limited to, installation of building supports and foundations, laying of underground pipework, and construction of permanent storage structures. With respect to a change in method of operation this term refers to those on-site activities, other than preparatory activities, which mark the initiation of the change.

(12) *Best available control technology* means an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of such pollutant. In no event shall application of best available control technology result in emis-

sions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61. If the reviewing authority determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

(13)(i) *Baseline concentration* means that ambient concentration level which exists in the baseline area at the time of the applicable minor source baseline date. A baseline concentration is determined for each pollutant for which a minor source baseline date is established and shall include:

(a) The actual emissions representative of sources in existence on the applicable minor source baseline date, except as provided in paragraph (b)(13)(ii) of this section;

(b) The allowable emissions of major stationary sources which commenced construction before the major source baseline date, but were not in operation by the applicable minor source baseline date.

(ii) The following will not be included in the baseline concentration and will affect the applicable maximum allowable increase(s):

(a) Actual emissions from any major stationary source on which construction commenced after the major source baseline date; and

(b) Actual emissions increases and decreases at any stationary source occurring after the minor source baseline date.

(14)(i) *Major source baseline date* means:

(a) In the case of particulate matter and sulfur dioxide, January 6, 1975, and

(b) In the case of nitrogen dioxide, February 8, 1988.

(ii) *Minor source baseline date* means the earliest date after the trigger date on which a major stationary source or a major modification subject to 40 CFR 52.21 or to regulations approved pursuant to 40 CFR 51.166 submits a complete application under the relevant regulations. The trigger date is:

(a) In the case of particulate matter and sulfur dioxide, August 7, 1977, and

(b) In the case of nitrogen dioxide, February 8, 1988.

(iii) The baseline date is established for each pollutant for which increments or other equivalent measures have been established if:

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(a) The area in which the proposed source or modification would construct is designated as attainment or unclassifiable under section 107(d)(i) (D) or (E) of the Act for the pollutant on the date of its complete application under 40 CFR 52.21 or under regulations approved pursuant to 40 CFR 51.166; and

(b) In the case of a major stationary source, the pollutant would be emitted in significant amounts, or, in the case of a major modification, there would be a significant net emissions increase of the pollutant.

(iv) Any minor source baseline date established originally for the TSP increments shall remain in effect and shall apply for purposes of determining the amount of available PM-10 increments, except that the reviewing authority may rescind any such minor source baseline date where it can be shown, to the satisfaction of the reviewing authority, that the emissions increase from the major stationary source, or the net emissions increase from the major modification, responsible for triggering that date did not result in a significant amount of PM-10 emissions.

(15)(i) *Baseline area* means any intrastate area (and every part thereof) designated as attainment or unclassifiable under section 107(d)(1) (D) or (E) of the Act in which the major source or major modification establishing the minor source baseline date would construct or would have an air quality impact equal to or greater than $1 \mu\text{g}/\text{m}^3$ (annual average) of the pollutant for which the minor source baseline date is established.

(ii) Area redesignations under section 107(d)(1) (D) or (E) of the Act cannot intersect or be smaller than the area of impact of any major stationary source or major modification which:

(a) Establishes a minor source baseline date; or

(b) Is subject to 40 CFR 52.21 or under regulations approved pursuant to 40 CFR 51.166, and would be constructed in the same state as the state proposing the redesignation.

(iii) Any baseline area established originally for the TSP increments shall remain in effect and shall apply for purposes of determining the amount of available PM-10 increments, except that such baseline area shall not remain in effect if the permit authority rescinds the corresponding minor source baseline date in accordance with paragraph (b)(14)(iv) of this section.

(16) *Allowable emissions* means the emissions rate of a stationary source calculated using the maximum rated capacity of the source (unless the source is subject to federally enforceable limits which restrict the operating rate, or hours of operation, or both) and the most stringent of the following:

(i) The applicable standards as set forth in 40 CFR parts 60 and 61;

(ii) The applicable State Implementation Plan emissions limitation, including those with a future compliance date; or

(iii) The emissions rate specified as a federally enforceable permit condition.

(17) *Federally enforceable* means all limitations and conditions which are enforceable by the Administrator, including those requirements developed pursuant to 40 CFR parts 60 and 61, requirements within any applicable State implementation plan, any permit requirements established pursuant to 40 CFR 52.21 or under regulations approved pursuant to 40 CFR part 51, subpart I, including operating permits issued under an EPA-approved program that is incorporated into the State implementation plan and expressly requires adherence to any permit issued under such program.

(18) *Secondary emissions* means emissions which occur as a result of the construction or operation of a major stationary source or major modification, but do not come from the major stationary source or major modification itself. For the purposes of this section, secondary emissions must be specific, well defined, quantifiable, and impact the same general areas the stationary source modification which causes the secondary emissions. Secondary emissions include emissions from any offsite support facility which would not be constructed or increase its emissions except as a result of the construction or operation of the major stationary source or major modification. Secondary emissions do not include any emissions which come directly from a mobile source, such as emissions from the tailpipe of a motor vehicle, from a train, or from a vessel.

(19) *Innovative control technology* means any system of air pollution control that has not been adequately demonstrated in practice, but would have a substantial likelihood of achieving greater continuous emissions reduction than any control system in current practice or of achieving at least comparable reductions at lower cost in terms of energy, economics, or nonair quality environmental impacts.

(20) *Fugitive emissions* means those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

(21)(i) *Actual emissions* means the actual rate of emissions of a pollutant from an emissions unit, as determined in accordance with paragraphs (b)(21)(ii) through (iv) of this section.

(ii) In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the unit actually emitted the pollutant during a two-year period which precedes the particular date and which is representative of normal source operation. The reviewing authority may allow the use of a different time period upon a de-

termination that it is more representative of normal source operation. Actual emissions shall be calculated using the unit's actual operating hours, production rates, and types of materials processed, stored, or combusted during the selected time period.

(iii) The reviewing authority may presume that source-specific allowable emissions for the unit are equivalent to the actual emissions of the unit.

(iv) For any emissions unit (other than an electric utility steam generating unit specified in paragraph (b)(21)(v) of this section) which has not begun normal operations on the particular date, actual emissions shall equal the potential to emit of the unit on that date.

(v) For an electric utility steam generating unit (other than a new unit or the replacement of an existing unit) actual emissions of the unit following the physical or operational change shall equal the representative actual annual emissions of the unit following the physical or operational change, provided the source owner or operator maintains and submits to the reviewing authority, on an annual basis for a period of 5 years from the date the unit resumes regular operation, information demonstrating that the physical or operational change did not result in an emissions increase. A longer period, not to exceed 10 years, may be required by the reviewing authority if it determines such a period to be more representative of normal source post-change operations.

(22) *Complete* means, in reference to an application for a permit, that the application contains all the information necessary for processing the application. Designating an application complete for purposes of permit processing does not preclude the reviewing authority from requesting or accepting any additional information.

(23)(i) *Significant* means, in reference to a net emissions increase or the potential of a source to emit any of the following pollutants, a rate of emissions that would equal or exceed any of the following rates:

Pollutant and Emissions Rate

Carbon monoxide: 100 tons per year (tpy)
 Nitrogen oxides: 40 tpy
 Sulfur dioxide: 40 tpy
 Particulate matter: 25 tpy of particulate matter emissions.
 15 tpy of PM₁₀ emissions.
 Ozone: 40 tpy of volatile organic compounds
 Lead: 0.6 tpy
 Asbestos: 0.007 tpy
 Beryllium: 0.0004 tpy
 Mercury: 0.1 tpy
 Vinyl chloride: 1 tpy
 Fluorides: 3 tpy
 Sulfuric acid mist: 7 tpy
 Hydrogen sulfide (H₂S): 10 tpy
 Total reduced sulfur (including H₂S): 10 tpy

Reduced sulfur compounds (including H₂S): 10 tpy
 Municipal waste combustor organics (measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans): 3.2×10^{-6} megagrams per year (3.5×10^{-6} tons per year)

Municipal waste combustor metals (measured as articulate matter): 14 megagrams per year (15 tons per year)
 Municipal waste combustor acid gases (measured as sulfur dioxide and hydrogen chloride): 36 megagrams per year (40 tons per year)

Municipal solid waste landfill emissions (measured as nonmethane organic compounds): 45 megagrams per year (50 tons per year)

(ii) *Significant* means, in reference to a net emissions increase or the potential of a source to emit a pollutant subject to regulation under the Act that paragraph (b)(23)(i) of this section, does not list, any emissions rate.

(iii) Notwithstanding paragraph (b)(23)(i) of this section, *significant* means any emissions rate or any net emissions increase associated with a major stationary source or major modification, which would construct within 10 kilometers of a Class I area, and have an impact on such area equal to or greater than $1 \mu\text{g}/\text{m}^3$ (24-hour average).

(24) *Federal Land Manager* means, with respect to any lands in the United States, the Secretary of the department with authority over such lands.

(25) *High terrain* means any area having an elevation 900 feet or more above the base of the stack of a source.

(26) *Low terrain* means any area other than high terrain.

(27) *Indian Reservation* means any federally recognized reservation established by Treaty, Agreement, Executive Order, or Act of Congress.

(28) *Indian Governing Body* means the governing body of any tribe, band, or group of Indians subject to the jurisdiction of the United States and recognized by the United States as possessing power of self-government.

(29) *Volatile organic compounds (VOC)* is as defined in § 51.100(s) of this part.

(30) *Electric utility steam generating unit* means any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam distribution system for the purpose of providing steam to a steam-electric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the affected facility.

(31) *Pollution control project* means any activity or project undertaken at an existing electric utility steam generating unit for purposes of reducing emissions from such unit. Such activities or projects are limited to:

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(i) The installation of conventional or innovative pollution control technology, including but not limited to advanced flue gas desulfurization, sorbent injection for sulfur dioxide and nitrogen oxides controls and electrostatic precipitators;

(ii) An activity or project to accommodate switching to a fuel which is less polluting than the fuel used prior to the activity or project, including but not limited to natural gas or coal re-burning, or the co-firing of natural gas and other fuels for the purpose of controlling emissions;

(iii) A permanent clean coal technology demonstration project conducted under title II, section 101(d) of the Further Continuing Appropriations Act of 1985 (section 5903(d) of title 42 of the United States Code), or subsequent appropriations, up to a total amount of \$2,500,000,000 for commercial demonstration of clean coal technology, or similar projects funded through appropriations for the Environmental Protection Agency, or

(iv) A permanent clean coal technology demonstration project that constitutes a repowering project.

(32) *Representative actual annual emissions* means the average rate, in tons per year, at which the source is projected to emit a pollutant for the two-year period after a physical change or change in the method of operation of a unit, (or a different consecutive two-year period within 10 years after that change, where the reviewing authority determines that such period is more representative of normal source operations), considering the effect any such change will have on increasing or decreasing the hourly emissions rate and on projected capacity utilization. In projecting future emissions the reviewing authority shall:

(i) Consider all relevant information, including but not limited to, historical operational data, the company's own representations, filings with the State or Federal regulatory authorities, and compliance plans under title IV of the Clean Air Act; and

(ii) Exclude, in calculating any increase in emissions that results from the particular physical change or change in the method of operation at an electric utility steam generating unit, that portion of the unit's emissions following the change that could have been accommodated during the representative baseline period and is attributable to an increase in projected capacity utilization at the unit that is unrelated to the particular change, including any increased utilization due to the rate of electricity demand growth for the utility system as a whole.

(33) *Clean coal technology* means any technology, including technologies applied at the precombustion, combustion, or post combustion stage, at a new or existing facility which will achieve significant reductions in air emissions of

sulfur dioxide or oxides of nitrogen associated with the utilization of coal in the generation of electricity, or process steam which was not in widespread use as of November 15, 1990.

(34) *Clean coal technology demonstration project* means a project using funds appropriated under the heading "Department of Energy—Clean Coal Technology", up to a total amount of \$2,500,000,000 for commercial demonstration of clean coal technology, or similar projects funded through appropriations for the Environmental Protection Agency. The Federal contribution for a qualifying project shall be at least 20 percent of the total cost of the demonstration project.

(35) *Temporary clean coal technology demonstration project* means a clean coal technology demonstration project that is operated for a period of 5 years or less, and which complies with the State implementation plan for the State in which the project is located and other requirements necessary to attain and maintain the national ambient air quality standards during and after the project is terminated.

(36) (i) *Repowering* means replacement of an existing coal-fired boiler with one of the following clean coal technologies: atmospheric or pressurized fluidized bed combustion, integrated gasification combined cycle, magnetohydrodynamics, direct and indirect coal-fired turbines, integrated gasification fuel cells, or as determined by the Administrator, in consultation with the Secretary of Energy, a derivative of one or more of these technologies, and any other technology capable of controlling multiple combustion emissions simultaneously with improved boiler or generation efficiency and with significantly greater waste reduction relative to the performance of technology in widespread commercial use as of November 15, 1990.

(ii) Repowering shall also include any oil and/or gas-fired unit which has been awarded clean coal technology demonstration funding as of January 1, 1991, by the Department of Energy.

(iii) The reviewing authority shall give expedited consideration to permit applications for any source that satisfies the requirements of this subsection and is granted an extension under section 409 of the Clean Air Act.

(37) *Reactivation of a very clean coal-fired electric utility steam generating unit* means any physical change or change in the method of operation associated with the commencement of commercial operations by a coal-fired utility unit after a period of discontinued operation where the unit:

(i) Has not been in operation for the two-year period prior to the enactment of the Clean Air Act Amendments of 1990, and the emissions from such unit continue to be carried in the permitting

authority's emissions inventory at the time of enactment;

(ii) Was equipped prior to shutdown with a continuous system of emissions control that achieves a removal efficiency for sulfur dioxide of no less than 85 percent and a removal efficiency for particulates of no less than 98 percent;

(iii) Is equipped with low-NO_x burners prior to the time of commencement of operations following reactivation; and

(iv) Is otherwise in compliance with the requirements of the Clean Air Act.

(c) *Ambient air increments.* The plan shall contain emission limitations and such other measures as may be necessary to assure that in areas designated as Class I, II, or III, increases in pollutant concentration over the baseline concentration shall be limited to the following:

| Pollutant | Maximum allowable increase (micrograms per cubic meter) |
|--|---|
| Class I | |
| Particulate matter: | |
| PM-10, annual arithmetic mean | 4 |
| PM-10, 24-hr maximum | 8 |
| Sulfur dioxide: | |
| Annual arithmetic mean | 2 |
| 24-hr maximum | 5 |
| 3-hr maximum | 25 |
| Nitrogen dioxide: Annual arithmetic mean | 2.5 |
| Class II | |
| Particulate matter: | |
| PM-10, annual arithmetic mean | 17 |
| PM-10, 24-hr maximum | 30 |
| Sulfur dioxide: | |
| Annual arithmetic mean | 20 |
| 24-hr maximum | 81 |
| 3-hr maximum | 512 |
| Nitrogen dioxide: Annual arithmetic mean | 26 |
| Class III | |
| Particulate matter: | |
| PM-10, annual arithmetic mean | 34 |
| PM-10, 24-hr maximum | 60 |
| Sulfur dioxide: | |
| Annual arithmetic mean | 40 |
| 24-hr maximum | 182 |
| 3-hr maximum | 700 |
| Nitrogen dioxide: Annual arithmetic mean | 50 |

For any period other than an annual period, the applicable maximum allowable increase may be exceeded during one such period per year at any one location.

(d) *Ambient air ceilings.* The plan shall provide that no concentration of a pollutant shall exceed:

(1) The concentration permitted under the national secondary ambient air quality standard, or

(2) The concentration permitted under the national primary ambient air quality standard, whichever concentration is lowest for the pollutant for a period of exposure.

(e) *Restrictions on area classifications.* The plan shall provide that—

(1) All of the following areas which were in existence on August 7, 1977, shall be Class I areas and may not be redesignated:

(i) International parks,

(ii) National wilderness areas which exceed 5,000 acres in size,

(iii) National memorial parks which exceed 5,000 acres in size, and

(iv) National parks which exceed 6,000 acres in size.

(2) Areas which were redesignated as Class I under regulations promulgated before August 7, 1977, shall remain Class I, but may be redesignated as provided in this section.

(3) Any other area, unless otherwise specified in the legislation creating such an area, is initially designated Class II, but may be redesignated as provided in this section.

(4) The following areas may be redesignated only as Class I or II:

(i) An area which as of August 7, 1977, exceeded 10,000 acres in size and was a national monument, a national primitive area, a national preserve, a national recreational area, a national wild and scenic river, a national wildlife refuge, a national lakeshore or seashore; and

(ii) A national park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres in size.

(f) *Exclusions from increment consumption.* (1) The plan may provide that the following concentrations shall be excluded in determining compliance with a maximum allowable increase:

(i) Concentrations attributable to the increase in emissions from stationary sources which have converted from the use of petroleum products, natural gas, or both by reason of an order in effect under section 2 (a) and (b) of the Energy Supply and Environmental Coordination Act of 1974 (or any superseding legislation) over the emissions from such sources before the effective date of such an order;

(ii) Concentrations attributable to the increase in emissions from sources which have converted from using natural gas by reason of natural gas curtailment plan in effect pursuant to the Federal Power Act over the emissions from such sources before the effective date of such plan;

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(iii) Concentrations of particulate matter attributable to the increase in emissions from construction or other temporary emission-related activities of new or modified sources;

(iv) The increase in concentrations attributable to new sources outside the United States over the concentrations attributable to existing sources which are included in the baseline concentration; and

(v) Concentrations attributable to the temporary increase in emissions of sulfur dioxide, particulate matter, or nitrogen oxides from stationary sources which are affected by plan revisions approved by the Administrator as meeting the criteria specified in paragraph (f)(4) of this section.

(2) If the plan provides that the concentrations to which paragraph (f)(1) (i) or (ii) of this section, refers shall be excluded, it shall also provide that no exclusion of such concentrations shall apply more than five years after the effective date of the order to which paragraph (f)(1)(i) of this section, refers or the plan to which paragraph (f)(1)(ii) of this section, refers, whichever is applicable. If both such order and plan are applicable, no such exclusion shall apply more than five years after the later of such effective dates.

(3) [Reserved]

(4) For purposes of excluding concentrations pursuant to paragraph (f)(1)(v) of this section, the Administrator may approve a plan revision that:

(i) Specifies the time over which the temporary emissions increase of sulfur dioxide, particulate matter, or nitrogen oxides would occur. Such time is not to exceed 2 years in duration unless a longer time is approved by the Administrator.

(ii) Specifies that the time period for excluding certain contributions in accordance with paragraph (f)(4)(i) of this section, is not renewable;

(iii) Allows no emissions increase from a stationary source which would:

(a) Impact a Class I area or an area where an applicable increment is known to be violated; or

(b) Cause or contribute to the violation of a national ambient air quality standard;

(iv) Requires limitations to be in effect the end of the time period specified in accordance with paragraph (f)(4)(i) of this section, which would ensure that the emissions levels from stationary sources affected by the plan revision would not exceed those levels occurring from such sources before the plan revision was approved.

(g) *Redesignation.* (1) The plan shall provide that all areas of the State (except as otherwise provided under paragraph (e) of this section) shall be designated either Class I, Class II, or Class III. Any designation other than Class II shall be subject to the redesignation procedures of this paragraph. Redesignation (except as otherwise precluded by paragraph (e) of this section) may be

proposed by the respective States or Indian Governing Bodies, as provided below, subject to approval by the Administrator as a revision to the applicable State implementation plan.

(2) The plan may provide that the State may submit to the Administrator a proposal to redesignate areas of the State Class I or Class II: *Provided, That:*

(i) At least one public hearing has been held in accordance with procedures established in § 51.102.

(ii) Other States, Indian Governing Bodies, and Federal Land Managers whose lands may be affected by the proposed redesignation were notified at least 30 days prior to the public hearing;

(iii) A discussion of the reasons for the proposed redesignation, including a satisfactory description and analysis of the health, environmental, economic, social, and energy effects of the proposed redesignation, was prepared and made available for public inspection at least 30 days prior to the hearing and the notice announcing the hearing contained appropriate notification of the availability of such discussion;

(iv) Prior to the issuance of notice respecting the redesignation of an area that includes any Federal lands, the State has provided written notice to the appropriate Federal Land Manager and afforded adequate opportunity (not in excess of 60 days) to confer with the State respecting the redesignation and to submit written comments and recommendations. In redesignating any area with respect to which any Federal Land Manager had submitted written comments and recommendations, the State shall have published a list of any inconsistency between such redesignation and such comments and recommendations (together with the reasons for making such redesignation against the recommendation of the Federal Land Manager); and

(v) The State has proposed the redesignation after consultation with the elected leadership of local and other substate general purpose governments in the area covered by the proposed redesignation.

(3) The plan may provide that any area other than an area to which paragraph (e) of this section refers may be redesignated as Class III if—

(i) The redesignation would meet the requirements of provisions established in accordance with paragraph (g)(2) of this section;

(ii) The redesignation, except any established by an Indian Governing Body, has been specifically approved by the Governor of the State, after consultation with the appropriate committees of the legislature, if it is in session, or with the leadership of the legislature, if it is not in session (unless State law provides that such redesignation must be specifically approved by State legislation)

and if general purpose units of local government representing a majority of the residents of the area to be redesignated enact legislation (including resolutions where appropriate) concurring in the redesignation;

(iii) The redesignation would not cause, or contribute to, a concentration of any air pollutant which would exceed any maximum allowable increase permitted under the classification of any other area or any national ambient air quality standard; and

(iv) Any permit application for any major stationary source or major modification subject to provisions established in accordance with paragraph (l) of this section which could receive a permit only if the area in question were redesignated as Class III, and any material submitted as part of that application, were available, insofar as was practicable, for public inspection prior to any public hearing on redesignation of any area as Class III.

(4) The plan shall provide that lands within the exterior boundaries of Indian Reservations may be redesignated only by the appropriate Indian Governing Body. The appropriate Indian Governing Body may submit to the Administrator a proposal to redesignate areas Class I, Class II, or Class III: *Provided, That:*

(i) The Indian Governing Body has followed procedures equivalent to those required of a State under paragraphs (g) (2), (3)(iii), and (3)(iv) of this section; and

(ii) Such redesignation is proposed after consultation with the State(s) in which the Indian Reservation is located and which border the Indian Reservation.

(5) The Administrator shall disapprove, within 90 days of submission, a proposed redesignation of any area only if he finds, after notice and opportunity for public hearing, that such redesignation does not meet the procedural requirements of this section or is inconsistent with paragraph (e) of this section. If any such disapproval occurs, the classification of the area shall be that which was in effect prior to the redesignation which was disapproved.

(6) If the Administrator disapproves any proposed area designation, the State or Indian Governing Body, as appropriate, may resubmit the proposal after correcting the deficiencies noted by the Administrator.

(h) *Stack heights.* The plan shall provide, as a minimum, that the degree of emission limitation required for control of any air pollutant under the plan shall not be affected in any manner by—

(1) So much of a stack height, not in existence before December 31, 1970, as exceeds good engineering practice, or

(2) Any other dispersion technique not implemented before then.

(i) *Review of major stationary sources and major modifications—source applicability and exemptions.*

(1) The plan shall provide that no major stationary source or major modification shall begin actual construction unless, as a minimum, requirements equivalent to those contained in paragraphs (j) through (r) of this section have been met.

(2) The plan shall provide that the requirements equivalent to those contained in paragraphs (j) through (r) of this section shall apply to any major stationary source and any major modification with respect to each pollutant subject to regulation under the Act that it would emit, except as this section would otherwise allow.

(3) The plan shall provide that requirements equivalent to those contained in paragraphs (j) through (r) of this section apply only to any major stationary source or major modification that would be constructed in an area which is designated as attainment or unclassifiable under section 107(a)(1) (D) or (E) of the Act; and

(4) The plan may provide that requirements equivalent to those contained in paragraphs (j) through (r) of this section do not apply to a particular major stationary source or major modification if:

(i) The major stationary source would be a non-profit health or nonprofit educational institution or a major modification that would occur at such an institution; or

(ii) The source or modification would be a major stationary source or major modification only if fugitive emissions, to the extent quantifiable, are considered in calculating the potential to emit of the stationary source or modification and such source does not belong to any following categories:

- (a) Coal cleaning plants (with thermal dryers);
- (b) Kraft pulp mills;
- (c) Portland cement plants;
- (d) Primary zinc smelters;
- (e) Iron and steel mills;
- (f) Primary aluminum ore reduction plants;
- (g) Primary copper smelters;
- (h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
- (i) Hydrofluoric, sulfuric, or nitric acid plants;
- (j) Petroleum refineries;
- (k) Lime plants;
- (l) Phosphate rock processing plants;
- (m) Coke oven batteries;
- (n) Sulfur recovery plants;
- (o) Carbon black plants (furnace process);
- (p) Primary lead smelters;
- (q) Fuel conversion plants;
- (r) Sintering plants;

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- (s) Secondary metal production plants;
- (t) Chemical process plants;
- (u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
- (v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
- (w) Taconite ore processing plants;
- (x) Glass fiber processing plants;
- (y) Charcoal production plants;
- (z) Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input;
 - (aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act; or
 - (iii) The source or modification is a portable stationary source which has previously received a permit under requirements equivalent to those contained in paragraphs (j) through (r) of this section, if:
 - (a) The source proposes to relocate and emissions of the source at the new location would be temporary; and
 - (b) The emissions from the source would not exceed its allowable emissions; and
 - (c) The emissions from the source would impact no Class I area and no area where an applicable increment is known to be violated; and
 - (d) Reasonable notice is given to the reviewing authority prior to the relocation identifying the proposed new location and the probable duration of operation at the new location. Such notice shall be given to the reviewing authority not less than 10 days in advance of the proposed relocation unless a different time duration is previously approved by the reviewing authority.
- (5) The plan may provide that requirements equivalent to those contained in paragraphs (j) through (r) of this section do not apply to a major stationary source or major modification with respect to a particular pollutant if the owner or operator demonstrates that, as to that pollutant, the source or modification is located in an area designated as nonattainment under section 107 of the Act.
- (6) The plan may provide that requirements equivalent to those contained in paragraphs (k), (m), and (o) of this section do not apply to a proposed major stationary source or major modification with respect to a particular pollutant, if the allowable emissions of that pollutant from a new source, or the net emissions increase of that pollutant from a modification, would be temporary and impact no Class I area and no area where an applicable increment is known to be violated.
- (7) The plan may provide that requirements equivalent to those contained in paragraphs (k), (m), and (o) of this section as they relate to any

maximum allowable increase for a Class II area do not apply to a modification of a major stationary source that was in existence on March 1, 1978, if the net increase in allowable emissions of each pollutant subject to regulation under the Act from the modification after the application of best available control technology would be less than 50 tons per year.

(8) The plan may provide that the reviewing authority may exempt a proposed major stationary source or major modification from the requirements of paragraph (m) of this section, with respect to monitoring for a particular pollutant, if:

(i) The emissions increase of the pollutant from a new stationary source or the net emissions increase of the pollutant from a modification would cause, in any area, air quality impacts less than the following amounts:

- (a) Carbon monoxide—575 $\mu\text{g}/\text{m}^3$, 8-hour average;
- (b) Nitrogen dioxide—14 $\mu\text{g}/\text{m}^3$, annual average;
- (c) Particulate matter—10 $\mu\text{g}/\text{m}^3$ of PM-10, 24-hour average.
- (d) Sulfur dioxide—13 $\mu\text{g}/\text{m}^3$, 24-hour average;
- (e) Ozone;¹
- (f) Lead—0.1 $\mu\text{g}/\text{m}^3$, 3-month average.
- (g) Mercury—0.25 $\mu\text{g}/\text{m}^3$, 24-hour average;
- (h) Beryllium—0.001 $\mu\text{g}/\text{m}^3$, 24-hour average;
- (i) Fluorides—0.25 $\mu\text{g}/\text{m}^3$, 24-hour average;
- (j) Vinyl chloride—15 $\mu\text{g}/\text{m}^3$, 24-hour average;
- (k) Total reduced sulfur—10 $\mu\text{g}/\text{m}^3$, 1-hour average;
- (l) Hydrogen sulfide—0.2 $\mu\text{g}/\text{m}^3$, 1-hour average;
- (m) Reduced sulfur compounds—10 $\mu\text{g}/\text{m}^3$, 1-hour average; or
- (ii) The concentrations of the pollutant in the area that the source or modification would affect are less than the concentrations listed in (i)(8)(i) of this section; or
- (iii) The pollutant is not listed in paragraph (i)(8)(i) of this section.

(9) If EPA approves a plan revision under 40 CFR 51.166 as in effect before August 7, 1980, any subsequent revision which meets the requirements of this section may contain transition provisions which parallel the transition provisions of 40 CFR 52.21(i)(9), (i)(10) and (m)(1)(v) as in effect on that date, which provisions relate to requirements for best available control technology and air quality analyses. Any such subsequent revision may not contain any transition provision which in the context of the revision would operate any less

¹ No *de minimis* air quality level is provided for ozone. However, any net increase of 100 tons per year or more of volatile organic compounds subject to PSD would be required to perform an ambient impact analysis, including the gathering of ambient air quality data.

stringently than would its counterpart in 40 CFR 52.21.

(10) If EPA approves a plan revision under § 51.166 as in effect [before July 31, 1987], any subsequent revision which meets the requirements of this section may contain transition provisions which parallel the transition provisions of § 52.21 (l)(11), and (m)(1) (vii) and (viii) of this chapter as in effect on that date, these provisions being related to monitoring requirements for particulate matter. Any such subsequent revision may not contain any transition provision which in the context of the revision would operate any less stringently than would its counterpart in § 52.21 of this chapter.

(11) The plan may provide that the permitting requirements equivalent to those contained in paragraph (k)(2) of this section do not apply to a stationary source or modification with respect to any maximum allowable increase for nitrogen oxides if the owner or operator of the source or modification submitted an application for a permit under the applicable permit program approved or promulgated under the Act before the provisions embodying the maximum allowable increase took effect as part of the plan and the permitting authority subsequently determined that the application as submitted before that date was complete.

(12) The plan may provide that the permitting requirements equivalent to those contained in paragraph (k)(2) of this section shall not apply to a stationary source or modification with respect to any maximum allowable increase for PM-10 if (i) the owner or operator of the source or modification submitted an application for a permit under the applicable permit program approved under the Act before the provisions embodying the maximum allowable increases for PM-10 took effect as part of the plan, and (ii) the permitting authority subsequently determined that the application as submitted before that date was complete. Instead, the applicable requirements equivalent to paragraph (k)(2) shall apply with respect to the maximum allowable increases for TSP as in effect on the date the application was submitted.

(j) *Control technology review.* The plan shall provide that:

(1) A major stationary source or major modification shall meet each applicable emissions limitation under the State Implementation Plan and each applicable emission standards and standard of performance under 40 CFR parts 60 and 61.

(2) A new major stationary source shall apply best available control technology for each pollutant subject to regulation under the Act that it would have the potential to emit in significant amounts.

(3) A major modification shall apply best available control technology for each pollutant subject

to regulation under the Act for which it would be a significant net emissions increase at the source. This requirement applies to each proposed emissions unit at which a net emissions increase in the pollutant would occur as a result of a physical change or change in the method of operation in the unit.

(4) For phased construction projects, the determination of best available control technology shall be reviewed and modified as appropriate at the least reasonable time which occurs no later than 18 months prior to commencement of construction of each independent phase of the project. At such time, the owner or operator of the applicable stationary source may be required to demonstrate the adequacy of any previous determination of best available control technology for the source.

(k) *Source impact analysis.* The plan shall provide that the owner or operator of the proposed source or modification shall demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reduction (including secondary emissions) would not cause or contribute to air pollution in violation of:

(1) Any national ambient air quality standard in any air quality control region; or

(2) Any applicable maximum allowable increase over the baseline concentration in any area.

(l) *Air quality models.* The plan shall provide for procedures which specify that—

(1) All applications of air quality modeling involved in this subpart shall be based on the applicable models, data bases, and other requirements specified in appendix W of this part (Guideline on Air Quality Models).

(2) Where an air quality model specified in appendix W of this part (Guideline on Air Quality Models) is inappropriate, the model may be modified or another model substituted. Such a modification or substitution of a model may be made on a case-by-case basis or, where appropriate, on a generic basis for a specific state program. Written approval of the Administrator must be obtained for any modification or substitution. In addition, use of a modified or substituted model must be subject to notice and opportunity for public comment under procedures set forth in § 51.102.

(m) *Air quality analysis—(1) Preapplication analysis.* (i) The plan shall provide that any application for a permit under regulations approved pursuant to this section shall contain an analysis of ambient air quality in the area that the major stationary source or major modification would affect for each of the following pollutants:

(a) For the source, each pollutant that it would have the potential to emit in a significant amount;

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(b) For the modification, each pollutant for which it would result in a significant net emissions increase.

(ii) The plan shall provide that, with respect to any such pollutant for which no National Ambient Air Quality Standard exists, the analysis shall contain such air quality monitoring data as the reviewing authority determines is necessary to assess ambient air quality for that pollutant in any area that the emissions of that pollutant would affect.

(iii) The plan shall provide that with respect to any such pollutant (other than nonmethane hydrocarbons) for which such a standard does exist, the analysis shall contain continuous air quality monitoring data gathered for purposes of determining whether emissions of that pollutant would cause or contribute to a violation of the standard or any maximum allowable increase.

(iv) The plan shall provide that, in general, the continuous air monitoring data that is required shall have been gathered over a period of one year and shall represent the year preceding receipt of the application, except that, if the reviewing authority determines that a complete and adequate analysis can be accomplished with monitoring data gathered over a period shorter than one year (but not to be less than four months), the data that is required shall have been gathered over at least that shorter period.

(v) The plan may provide that the owner or operator of a proposed major stationary source or major modification of volatile organic compounds who satisfies all conditions of 40 CFR part 51 appendix S, section IV may provide postapproval monitoring data for ozone in lieu of providing preconstruction data as required under paragraph (m)(1) of this section.

(2) *Post-construction monitoring.* The plan shall provide that the owner or operator of a major stationary source or major modification shall, after construction of the stationary source or modification, conduct such ambient monitoring as the reviewing authority determines is necessary to determine the effect emissions from the stationary source or modification may have, or are having, on air quality in any area.

(3) *Operation of monitoring stations.* The plan shall provide that the owner or operator of a major stationary source or major modification shall meet the requirements of appendix B to part 58 of this chapter during the operation of monitoring stations for purposes of satisfying paragraph (m) of this section.

(n) *Source information.* (1) The plan shall provide that the owner or operator of a proposed source or modification shall submit all information necessary to perform any analysis or make any determination required under procedures established in accordance with this section.

(2) The plan may provide that such information shall include:

(i) A description of the nature, location, design capacity, and typical operating schedule of the source or modification, including specifications and drawings showing its design and plant layout;

(ii) A detailed schedule for construction of the source or modification;

(iii) A detailed description as to what system of continuous emission reduction is planned by the source or modification, emission estimates, and any other information as necessary to determine that best available control technology as applicable would be applied;

(3) The plan shall provide that upon request of the State, the owner or operator shall also provide information on:

(i) The air quality impact of the source or modification, including meteorological and topographical data necessary to estimate such impact; and

(ii) The air quality impacts and the nature and extent of any or all general commercial, residential, industrial, and other growth which has occurred since August 7, 1977, in the area the source or modification would affect.

(o) *Additional impact analyses.* The plan shall provide that—

(1) The owner or operator shall provide an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial, and other growth associated with the source or modification. The owner or operator need not provide an analysis of the impact on vegetation having no significant commercial or recreational value.

(2) The owner or operator shall provide an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the source or modification.

(p) *Sources impacting Federal Class I areas—additional requirements—(1) Notice to EPA.* The plan shall provide that the reviewing authority shall transmit to the Administrator a copy of each permit application relating to a major stationary source or major modification and provide notice to the Administrator of every action related to the consideration of such permit.

(2) *Federal Land Manager.* The Federal Land Manager and the Federal official charged with direct responsibility for management of Class I lands have an affirmative responsibility to protect the air quality related values (including visibility) of any such lands and to consider, in consultation with the Administrator, whether a proposed source or modification would have an adverse impact on such values.

(3) *Denial—impact on air quality related values.* The plan shall provide a mechanism whereby a Federal Land Manager of any such lands may present to the State, after the reviewing authority's preliminary determination required under procedures developed in accordance with paragraph (r) of this section, a demonstration that the emissions from the proposed source or modification would have an adverse impact on the air quality-related values (including visibility) of any Federal mandatory Class I lands, notwithstanding that the change in air quality resulting from emissions from such source or modification would not cause or contribute to concentrations which would exceed the maximum allowable increases for a Class I area. If the State concurs with such demonstration, the reviewing authority shall not issue the permit.

(4) *Class I Variances.* The plan may provide that the owner or operator of a proposed source or modification may demonstrate to the Federal Land Manager that the emissions from such source would have no adverse impact on the air quality related values of such lands (including visibility), notwithstanding that the change in air quality resulting from emissions from such source or modification would cause or contribute to concentrations which would exceed the maximum allowable increases for a Class I area. If the Federal land manager concurs with such demonstration and so certifies to the State, the reviewing authority may: *Provided,* That applicable requirements are otherwise met, issue the permit with such emission limitations as may be necessary to assure that emissions of sulfur dioxide, particulate matter, and nitrogen oxides would not exceed the following maximum allowable increases over minor source baseline concentration for such pollutants:

| Pollutant | Maximum allowable increase (micrograms per cubic meter) |
|--|---|
| Particulate matter: | |
| PM-10, annual arithmetic mean | 17 |
| PM-10, 24-hour maximum | 30 |
| Sulfur dioxide: | |
| Annual arithmetic mean | 20 |
| 24-hr maximum | 91 |
| 3-hr maximum | 325 |
| Nitrogen dioxide: Annual arithmetic mean | 25 |

(5) *Sulfur dioxide variance by Governor with Federal Land Manager's concurrence.* The plan may provide that—

(i) The owner or operator of a proposed source or modification which cannot be approved under procedures developed pursuant to paragraph (q)(4) of this section may demonstrate to the Governor

that the source or modification cannot be constructed by reason of any maximum allowable increase for sulfur dioxide for periods of twenty-four hours or less applicable to any Class I area and, in the case of Federal mandatory Class I areas, that a variance under this clause would not adversely affect the air quality related values of the area (including visibility);

(ii) The Governor, after consideration of the Federal Land Manager's recommendation (if any) and subject to his concurrence, may grant, after notice and an opportunity for a public hearing, a variance from such maximum allowable increase; and

(iii) If such variance is granted, the reviewing authority may issue a permit to such source or modification in accordance with provisions developed pursuant to paragraph (q)(7) of this section: *Provided,* That the applicable requirements of the plan are otherwise met.

(6) *Variance by the Governor with the President's concurrence.* The plan may provide that—

(i) The recommendations of the Governor and the Federal Land Manager shall be transferred to the President in any case where the Governor recommends a variance in which the Federal Land Manager does not concur;

(ii) The President may approve the Governor's recommendation if he finds that such variance is in the national interest; and

(iii) If such a variance is approved, the reviewing authority may issue a permit in accordance with provisions developed pursuant to the requirements of paragraph (q)(7) of this section: *Provided,* That the applicable requirements of the plan are otherwise met.

(7) *Emission limitations for Presidential or gubernatorial variance.* The plan shall provide that in the case of a permit issued under procedures developed pursuant to paragraph (q) (5) or (6) of this section, the source or modification shall comply with emission limitations as may be necessary to assure that emissions of sulfur dioxide from the source or modification would not (during any day on which the otherwise applicable maximum allowable increases are exceeded) cause or contribute to concentrations which would exceed the following maximum allowable increases over the baseline concentration and to assure that such emissions would not cause or contribute to concentrations which exceed the otherwise applicable maximum allowable increases for periods of exposure of 24 hours or less for more than 18 days, not necessarily consecutive, during any annual period:

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MAXIMUM ALLOWABLE INCREASE
[Micrograms per cubic meter]

| Period of exposure | Terrain areas | |
|--------------------|---------------|------|
| | Low | High |
| 24-hr maximum | 38 | 62 |
| 3-hr maximum | 130 | 221 |

(g) *Public participation.* The plan shall provide that—

(1) The reviewing authority shall notify all applicants within a specified time period as to the completeness of the application or any deficiency in the application or information submitted. In the event of such a deficiency, the date of receipt of the application shall be the date on which the reviewing authority received all required information.

(2) Within one year after receipt of a complete application, the reviewing authority shall:

(i) Make a preliminary determination whether construction should be approved, approved with conditions, or disapproved.

(ii) Make available in at least one location in each region in which the proposed source would be constructed a copy of all materials the applicant submitted, a copy of the preliminary determination, and a copy or summary of other materials, if any, considered in making the preliminary determination.

(iii) Notify the public, by advertisement in a newspaper of general circulation in each region in which the proposed source would be constructed, of the application, the preliminary determination, the degree of increment consumption that is expected from the source or modification, and of the opportunity for comment at a public hearing as well as written public comment.

(iv) Send a copy of the notice of public comment to the applicant, the Administrator and to officials and agencies having cognizance over the location where the proposed construction would occur as follows: Any other State or local air pollution control agencies, the chief executives of the city and county where the source would be located; any comprehensive regional land use planning agency, and any State, Federal Land Manager, or Indian Governing body whose lands may be affected by emissions from the source or modification.

(v) Provide opportunity for a public hearing for interested persons to appear and submit written or oral comments on the air quality impact of the source, alternatives to it, the control technology required, and other appropriate considerations.

(vi) Consider all written comments submitted within a time specified in the notice of public comment and all comments received at any public hearing(s) in making a final decision on the ap-

provability of the application. The reviewing authority shall make all comments available for public inspection in the same locations where the reviewing authority made available preconstruction information relating to the proposed source or modification.

(vii) Make a final determination whether construction should be approved, approved with conditions, or disapproved.

(viii) Notify the applicant in writing of the final determination and make such notification available for public inspection at the same location where the reviewing authority made available preconstruction information and public comments relating to the source.

(r) *Source obligation.* (1) The plan shall include enforceable procedures to provide that approval to construct shall not relieve any owner or operator of the responsibility to comply fully with applicable provisions of the plan and any other requirements under local, State or Federal law.

(2) The plan shall provide that at such time that a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements of paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification.

(s) *Innovative control technology.* (1) The plan may provide that an owner or operator of a proposed major stationary source or major modification may request the reviewing authority to approve a system of innovative control technology.

(2) The plan may provide that the reviewing authority may, with the consent of the governor(s) of other affected state(s), determine that the source or modification may employ a system of innovative control technology, if:

(i) The proposed control system would not cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function;

(ii) The owner or operator agrees to achieve a level of continuous emissions reduction equivalent to that which would have been required under paragraph (j)(2) of this section, by a date specified by the reviewing authority. Such date shall not be later than 4 years from the time of startup or 7 years from permit issuance;

(iii) The source or modification would meet the requirements equivalent to those in paragraphs (j) and (k) of this section, based on the emissions rate that the stationary source employing the system of innovative control technology would be required

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to meet on the date specified by the reviewing authority;

(iv) The source or modification would not before the date specified by the reviewing authority:

(a) Cause or contribute to any violation of an applicable national ambient air quality standard; or

(b) Impact any area where an applicable increment is known to be violated;

(v) All other applicable requirements including those for public participation have been met.

(vi) The provisions of paragraph (p) of this section (relating to Class I areas) have been satisfied with respect to all periods during the life of the source or modification.

(3) The plan shall provide that the reviewing authority shall withdraw any approval to employ a system of innovative control technology made under this section, if:

(i) The proposed system fails by the specified date to achieve the required continuous emissions reduction rate; or

(ii) The proposed system fails before the specified date so as to contribute to an unreasonable risk to public health, welfare, or safety; or

(iii) The reviewing authority decides at any time that the proposed system is unlikely to achieve the required level of control or to protect the public health, welfare, or safety.

(4) The plan may provide that if a source or modification fails to meet the required level of continuous emissions reduction within the specified time period, or if the approval is withdrawn in accordance with paragraph (s)(3) of this section, the reviewing authority may allow the source or modification up to an additional 3 years to meet the requirement for the application of best available control technology through use of a demonstrated system of control.

(Secs. 101(b)(1), 110, 160-169, 171-178, and 301(a), Clean Air Act, as amended (42 U.S.C. 7401(b)(1), 7410, 7470-7479, 7501-7508, and 7601(a)); sec. 129(a), Clean Air Act Amendments of 1977 (Pub. L. 95-95, 91 Stat. 685 (Aug. 7, 1977)))

[43 FR 26382, June 19, 1978]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 51.166, see the List of CFR Sections Affected in the Finding Aids section of this volume.

40 CRF SECCIÓN 52.21

Environmental Protection Agency, EPA

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Region 4, 345 Courtland Street, N.E., Atlanta, GA 30365.

(5) Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. EPA Region 5, 77 West Jackson Boulevard, Chicago, IL 60604-3507.

(6) Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. EPA Region 6, Fountain Place, 1445 Ross Avenue, Suite 1200, Dallas, TX 75202-2733.

(7) Iowa, Kansas, Missouri, and Nebraska. EPA Region 7, 726 Minnesota Avenue, Kansas City, KS 66101.

(8) Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming. EPA Region 8, 999 18th Street, Suite 500, Denver, CO 80202-2466.

(9) Arizona, California, Hawaii, Nevada, American Samoa, and Guam. EPA, Region 9, 75 Hawthorne Street, San Francisco, CA 94105.

(10) Alaska, Idaho, Oregon, and Washington. EPA, Region 10, 1200 6th Avenue, Seattle, WA 98101.

[61 FR 16061, Apr. 11, 1996]

§ 52.17 Severability of provisions.

The provisions promulgated in this part and the various applications thereof are distinct and severable. If any provision of this part or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or application of such provision to other persons or circumstances which can be given effect without the invalid provision or application.

[37 FR 19808, Sept. 22, 1972]

§ 52.18 Abbreviations.

Abbreviations used in this part shall be those set forth in part 60 of this chapter.

[38 FR 12698, May 14, 1973]

§ 52.20 Attainment dates for national standards.

Each subpart contains a section which specifies the latest dates by which national standards are to be attained in each region in the State. An attainment date which only refers to a month and a year (such as July 1975) shall be construed to mean the last day of the month in question. However, the specification of attainment dates for national standards does not relieve any

State from the provisions of subpart N of this chapter which require all sources and categories of sources to comply with applicable requirements of the plan—

(a) As expeditiously as practicable where the requirement is part of a control strategy designed to attain a primary standard, and

(b) Within a reasonable time where the requirement is part of a control strategy designed to attain a secondary standard.

[37 FR 19808, Sept. 22, 1972, as amended at 39 FR 34535, Sept. 26, 1974; 51 FR 40676, Nov. 7, 1986]

§ 52.21 Prevention of significant deterioration of air quality.

(a) *Plan disapproval.* The provisions of this section are applicable to any State implementation plan which has been disapproved with respect to prevention of significant deterioration of air quality in any portion of any State where the existing air quality is better than the national ambient air quality standards. Specific disapprovals are listed where applicable, in subparts B through DDD of this part. The provisions of this section have been incorporated by reference into the applicable implementation plans for various States, as provided in subparts B through DDD of this part. Where this section is so incorporated, the provisions shall also be applicable to all lands owned by the Federal Government and Indian Reservations located in such State. No disapproval with respect to a State's failure to prevent significant deterioration of air quality shall invalidate or otherwise affect the obligations of States, emission sources, or other persons with respect to all portions of plans approved or promulgated under this part.

(b) *Definitions.* For the purposes of this section:

(1)(i) *Major stationary source* means:

(a) Any of the following stationary sources of air pollutants which emits, or has the potential to emit, 100 tons per year or more of any pollutant subject to regulation under the Act: Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), kraft

pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants, and charcoal production plants;

(b) Notwithstanding the stationary source size specified in paragraph (b)(1)(i) of this section, any stationary source which emits, or has the potential to emit, 250 tons per year or more of any air pollutant subject to regulation under the Act; or

(c) Any physical change that would occur at a stationary source not otherwise qualifying under paragraph (b)(1) of this section, as a major stationary source, if the changes would constitute a major stationary source by itself.

(i) A major stationary source that is major for volatile organic compounds shall be considered major for ozone.

(ii) The fugitive emissions of a stationary source shall not be included in determining for any of the purposes of this section whether it is a major stationary source, unless the source belongs to one of the following categories of stationary sources:

(a) Coal cleaning plants (with thermal dryers);

(b) Kraft pulp mills;

(c) Portland cement plants;

(d) Primary zinc smelters;

(e) Iron and steel mills;

(f) Primary aluminum ore reduction plants;

(g) Primary copper smelters;

(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;

(i) Hydrofluoric, sulfuric, or nitric acid plants;

(j) Petroleum refineries;

(k) Lime plants;

(l) Phosphate rock processing plants;

(m) Coke oven batteries;

(n) Sulfur recovery plants;

(o) Carbon black plants (furnace process);

(p) Primary lead smelters;

(q) Fuel conversion plants;

(r) Sintering plants;

(s) Secondary metal production plants;

(t) Chemical process plants;

(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;

(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;

(w) Taconite ore processing plants;

(x) Glass fiber processing plants;

(y) Charcoal production plants;

(z) Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, and

(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

(2)(i) *Major modification* means any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act.

(ii) Any net emissions increase that is significant for volatile organic compounds shall be considered significant for ozone.

(iii) A physical change or change in the method of operation shall not include:

(a) Routine maintenance, repair and replacement;

(b) Use of an alternative fuel or raw material by reason of an order under sections 2 (a) and (b) of the Energy Supply and Environmental Coordination Act of 1974 (or any superseding legislation) or by reason of a natural gas curtailment plant pursuant to the Federal Power Act;

(c) Use of an alternative fuel by reason of an order or rule under section 125 of the Act;

(d) Use of an alternative fuel at a steam generating unit to the extent that the fuel is generated from municipal solid waste:

(e) Use of an alternative fuel or raw material by a stationary source which:

(1) The source was capable of accommodating before January 6, 1975, unless such change would be prohibited under any federally enforceable permit condition which was established after January 6, 1975 pursuant to 40 CFR 52.21 or under regulations approved pursuant to 40 CFR subpart I or 40 CFR 51.166; or

(2) The source is approved to use under any permit issued under 40 CFR 52.21 or under regulations approved pursuant to 40 CFR 51.166;

(f) An increase in the hours of operation or in the production rate, unless such change would be prohibited under any federally enforceable permit condition which was established after January 6, 1975, pursuant to 40 CFR 52.21 or under regulations approved pursuant to 40 CFR subpart I or 40 CFR 51.166.

(g) Any change in ownership at a stationary source.

(h) The addition, replacement or use of a pollution control project at an existing electric utility steam generating unit, unless the Administrator determines that such addition, replacement, or use renders the unit less environmentally beneficial, or except:

(1) When the Administrator has reason to believe that the pollution control project would result in a significant net increase in representative actual annual emissions of any criteria pollutant over levels used for that source in the most recent air quality impact analysis in the area conducted for the purpose of title I, if any, and

(2) The Administrator determines that the increase will cause or contribute to a violation of any national ambient air quality standard or PSD increment, or visibility limitation.

(i) The installation, operation, cessation, or removal of a temporary clean coal technology demonstration project, provided that the project complies with:

(1) The State implementation plan for the State in which the project is located, and

(2) Other requirements necessary to attain and maintain the national ambi-

ent air quality standards during the project and after it is terminated.

(j) The installation or operation of a permanent clean coal technology demonstration project that constitutes repowering, provided that the project does not result in an increase in the potential to emit of any regulated pollutant emitted by the unit. This exemption shall apply on a pollutant-by-pollutant basis.

(k) The reactivation of a very clean coal-fired electric utility steam generating unit.

(3)(i) *Net emissions increase* means the amount by which the sum of the following exceeds zero:

(a) Any increase in actual emissions from a particular physical change or change in method of operation at a stationary source; and

(b) Any other increases and decreases in actual emissions at the source that are contemporaneous with the particular change and are otherwise creditable.

(ii) An increase or decrease in actual emissions is contemporaneous with the increase from the particular change only if it occurs between:

(a) The date five years before construction on the particular change commences; and

(b) The date that the increase from the particular change occurs.

(iii) An increase or decrease in actual emissions is creditable only if the Administrator has not relied on it in issuing a permit for the source under this section, which permit is in effect when the increase in actual emissions from the particular change occurs.

(iv) An increase or decrease in actual emissions of sulfur dioxide, particulate matter, or nitrogen oxide, which occurs before the applicable minor source baseline date is creditable only if it is required to be considered in calculating the amount of maximum allowable increases remaining available. With respect to particulate matter, only PM-10 emissions can be used to evaluate the net emissions increase for PM-10.

(v) An increase in actual emissions is creditable only to the extent that the new level of actual emissions exceeds the old level.

(vi) A decrease in actual emissions is creditable only to the extent that:

(a) The old level of actual emissions or the old level of allowable emissions, whichever is lower, exceeds the new level of actual emissions;

(b) It is federally enforceable at and after the time that actual construction on the particular change begins; and

(c) It has approximately the same qualitative significance for public health and welfare as that attributed to the increase from the particular change.

(vii) [Reserved]

(viii) An increase that results from a physical change at a source occurs when the emissions unit on which construction occurred becomes operational and begins to emit a particular pollutant. Any replacement unit that requires shakedown becomes operational only after a reasonable shakedown period, not to exceed 180 days.

(4) *Potential to emit* means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source.

(5) *Stationary source* means any building, structure, facility, or installation which emits or may emit any air pollutant subject to regulation under the Act.

(6) *Building, structure, facility, or installation* means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control) except the activities of any vessel. Pollutant-emitting activities shall be considered as part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same first two digit code) as described in the *Standard Industrial*

Classification Manual, 1972, as amended by the 1977 Supplement (U. S. Government Printing Office stock numbers 4101-0066 and 003-005-00176-0, respectively).

(7) *Emissions unit* means any part of a stationary source which emits or would have the potential to emit any pollutant subject to regulation under the Act.

(8) *Construction* means any physical change or change in the method of operation (including fabrication, erection, installation, demolition, or modification of an emissions unit) which would result in a change in actual emissions.

(9) *Commence* as applied to construction of a major stationary source or major modification means that the owner or operator has all necessary preconstruction approvals or permits and either has:

(i) Begun, or caused to begin, a continuous program of actual on-site construction of the source, to be completed within a reasonable time; or

(ii) Entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the owner or operator, to undertake a program of actual construction of the source to be completed within a reasonable time.

(10) *Necessary preconstruction approvals or permits* means those permits or approvals required under Federal air quality control laws and regulations and those air quality control laws and regulations which are part of the applicable State Implementation Plan.

(11) *Begin actual construction* means, in general, initiation of physical on-site construction activities on an emissions unit which are of a permanent nature. Such activities include, but are not limited to, installation of building supports and foundations, laying underground pipework and construction of permanent storage structures. With respect to a change in method of operations, this term refers to those on-site activities other than preparatory activities which mark the initiation of the change.

(12) *Best available control technology* means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction

for each pollutant subject to regulation under Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

(13)(i) "Baseline concentration" means that ambient concentration level which exists in the baseline area at the time of the applicable minor source baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and shall include:

(a) The actual emissions representative of sources in existence on the applicable minor source baseline date, except as provided in paragraph (b)(13)(ii) of this section;

(b) The allowable emissions of major stationary sources which commenced construction before the major source baseline date but were not in operation by the applicable minor source baseline date.

(i) The following will not be included in the baseline concentration and will

affect the applicable maximum allowable increase(s):

(a) Actual emissions from any major stationary source on which construction commenced after the major source baseline date; and

(b) Actual emissions increases and decreases at any stationary source occurring after the minor source baseline date.

(14)(i) *Major source baseline date* means:

(a) In the case of particulate matter and sulfur dioxide, January 6, 1975, and

(b) In the case of nitrogen dioxide, February 8, 1988.

(ii) "Minor source baseline date" means the earliest date after the trigger date on which a major stationary source or a major modification subject to 40 CFR 52.21 or to regulations approved pursuant to 40 CFR 51.166 submits a complete application under the relevant regulations. The trigger date is:

(a) In the case of particulate matter and sulfur dioxide, August 7, 1977, and

(b) In the case of nitrogen dioxide, February 8, 1988.

(iii) The baseline date is established for each pollutant for which increments or other equivalent measures have been established if:

(a) The area in which the proposed source or modification would construct is designated as attainment or unclassifiable under section 107(d)(1)(D) or (E) of the Act for the pollutant on the date of its complete application under 40 CFR 52.21; and

(b) In the case of a major stationary source, the pollutant would be emitted in significant amounts, or, in the case of a major modification, there would be a significant net emissions increase of the pollutant.

(iv) Any minor source baseline date established originally for the TSP increments shall remain in effect and shall apply for purposes of determining the amount of available PM-10 increments, except that the Administrator shall rescind a minor source baseline date where it can be shown, to the satisfaction of the Administrator, that the emissions increase from the major stationary source, or net emissions increase from the major modification, responsible for triggering that date did

not result in a significant amount of PM-10 emissions.

(15)(i) *Baseline area* means any intrastate area (and every part thereof) designated as attainment or unclassifiable under section 107(d)(1) (D) or (E) of the Act in which the major source or major modification establishing the minor source baseline date would construct or would have an air quality impact equal to or greater than $1 \mu\text{g}/\text{m}^3$ (annual average) of the pollutant for which the minor source baseline date is established.

(ii) Area redesignations under section 107(d)(1) (D) or (E) of the Act cannot intersect or be smaller than the area of impact of any major stationary source or major modification which:

(a) Establishes a minor source baseline date; or

(b) Is subject to 40 CFR 52.21 and would be constructed in the same state as the state proposing the redesignation.

(iii) Any baseline area established originally for the TSP increments shall remain in effect and shall apply for purposes of determining the amount of available PM-10 increments, except that such baseline area shall not remain in effect if the Administrator rescinds the corresponding minor source baseline date in accordance with paragraph (b)(14)(iv) of this section.

(16) *Allowable emissions* means the emissions rate of a stationary source calculated using the maximum rated capacity of the source (unless the source is subject to federally enforceable limits which restrict the operating rate, or hours of operation, or both) and the most stringent of the following:

(i) The applicable standards as set forth in 40 CFR parts 60 and 61;

(ii) The applicable State Implementation Plan emissions limitation, including those with a future compliance date; or

(iii) The emissions rate specified as a federally enforceable permit condition, including those with a future compliance date.

(17) *Federally enforceable* means all limitations and conditions which are enforceable by the Administrator, including those requirements developed pursuant to 40 CFR parts 60 and 61, re-

quirements within any applicable State implementation plan, any permit requirements established pursuant to 40 CFR 52.21 or under regulations approved pursuant to 40 CFR part 51, subpart I, including operating permits issued under an EPA-approved program that is incorporated into the State implementation plan and expressly requires adherence to any permit issued under such program.

(18) *Secondary emissions* means emissions which would occur as a result of the construction or operation of a major stationary source or major modification, but do not come from the major stationary source or major modification itself. Secondary emissions include emissions from any off-site support facility which would not be constructed or increase its emissions except as a result of the construction or operation of the major stationary source or major modification. Secondary emissions do not include any emissions which come directly from a mobile source, such as emissions from the tailpipe of a motor vehicle, from a train, or from a vessel.

(i) Emissions from ships or trains coming to or from the new or modified stationary source; and

(ii) Emissions from any offsite support facility which would not otherwise be constructed or increase its emissions as a result of the construction or operation of the major stationary source or major modification.

(19) *Innovative control technology* means any system of air pollution control that has not been adequately demonstrated in practice, but would have a substantial likelihood of achieving greater continuous emissions reduction than any control system in current practice or of achieving at least comparable reductions at lower cost in terms of energy, economics, or nonair quality environmental impacts.

(20) *Fugitive emissions* means those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

(21)(i) *Actual emissions* means the actual rate of emissions of a pollutant from an emissions unit, as determined in accordance with paragraphs (b)(21)(ii) through (iv) of this section.

(ii) In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the unit actually emitted the pollutant during a two-year period which precedes the particular date and which is representative of normal source operation. The Administrator shall allow the use of a different time period upon a determination that it is more representative of normal source operation. Actual emissions shall be calculated using the unit's actual operating hours, production rates, and types of materials processed, stored, or combusted during the selected time period.

(iii) The Administrator may presume that source-specific allowable emissions for the unit are equivalent to the actual emissions of the unit.

(iv) For any emissions unit (other than an electric utility steam generating unit specified in paragraph (b)(21)(v) of this section) which has not begun normal operations on the particular date, actual emissions shall equal the potential to emit of the unit on that date.

(v) For an electric utility steam generating unit (other than a new unit or the replacement of an existing unit) actual emissions of the unit following the physical or operational change shall equal the representative actual annual emissions of the unit, provided the source owner or operator maintains and submits to the Administrator on an annual basis for a period of 5 years from the date the unit resumes regular operation, information demonstrating that the physical or operational change did not result in an emissions increase. A longer period, not to exceed 10 years, may be required by the Administrator if he determines such a period to be more representative of normal source post-change operations.

(22) *Complete* means, in reference to an application for a permit, that the application contains all of the information necessary for processing the application.

(23) (i) *Significant* means, in reference to a net emissions increase or the potential of a source to emit any of the following pollutants, a rate of emissions that would equal or exceed any of the following rates:

Pollutant and Emissions Rate

Carbon monoxide: 100 tons per year (tpy)
 Nitrogen oxides: 40 tpy
 Sulfur dioxide: 40 tpy
 Particulate matter:
 25 tpy of particulate matter emissions;
 15 tpy of PM₁₀ emissions
 Ozone: 40 tpy of volatile organic compounds
 Lead: 0.6 tpy
 Asbestos: 0.007 tpy
 Beryllium: 0.0004 tpy
 Mercury: 0.1 tpy
 Vinyl chloride: 1 tpy
 Fluorides: 3 tpy
 Sulfuric acid mist: 7 tpy
 Hydrogen sulfide (H₂S): 10 tpy
 Total reduced sulfur (including H₂S): 10 tpy
 Reduced sulfur compounds (including H₂S):
 10 tpy
 Municipal waste combustor organics (measured as total tetra- through octachlorinated dibenzo-p-dioxins and dibenzofurans): 3.2×10^{-6} megagrams per year (3.5×10^{-6} tons per year). Municipal waste combustor metals (measured as particulate matter): 14 megagrams per year (15 tons per year)
 Municipal waste combustor acid gases (measured as sulfur dioxide and hydrogen chloride): 36 megagrams per year (40 tons per year)
 Municipal solid waste landfills emissions (measured as nonmethane organic compounds): 45 megagrams per year (50 tons per year)

(ii) *Significant* means, in reference to a net emissions increase or the potential of a source to emit a pollutant subject to regulation under the Act that paragraph (b)(23)(i) of this section, does not list, any emissions rate.

(iii) Notwithstanding paragraph (b)(23)(i) of this section, *significant* means any emissions rate or any net emissions increase associated with a major stationary source or major modification, which would construct within 10 kilometers of a Class I area, and have an impact on such area equal to or greater than 1 µg/m³, (24-hour average).

(24) *Federal Land Manager* means, with respect to any lands in the United States, the Secretary of the department with authority over such lands.

(25) *High terrain* means any area having an elevation 900 feet or more above the base of the stack of a source.

(26) *Low terrain* means any area other than high terrain.

(27) *Indian Reservation* means any federally recognized reservation established by Treaty, Agreement, executive order, or act of Congress.

(28) *Indian Governing Body* means the governing body of any tribe, band, or group of Indians subject to the jurisdiction of the United States and recognized by the United States as possessing power of self government.

(29) *Adverse impact on visibility* means visibility impairment which interferes with the management, protection, preservation or enjoyment of the visitor's visual experience of the Federal Class I area. This determination must be made on a case-by-case basis taking into account the geographic extent, intensity, duration, frequency and time of visibility impairment, and how these factors correlate with (1) times of visitor use of the Federal Class I area, and (2) the frequency and timing of natural conditions that reduce visibility.

(30) *Volatile organic compounds (VOC)* is as defined in § 51.100(s) of this chapter.

(31) *Electric utility steam generating unit* means any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam distribution system for the purpose of providing steam to a steam-electric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the affected facility.

(32) *Pollution control project* means any activity or project undertaken at an existing electric utility steam generating unit for purposes of reducing emissions from such unit. Such activities or projects are limited to:

(i) The installation of conventional or innovative pollution control technology, including but not limited to advanced flue gas desulfurization, sorbent injection for sulfur dioxide and nitrogen oxides controls and electrostatic precipitators;

(ii) An activity or project to accommodate switching to a fuel which is less polluting than the fuel in use prior to the activity or project, including,

but not limited to natural gas or coal re-burning, or the co-firing of natural gas and other fuels for the purpose of controlling emissions;

(iii) A permanent clean coal technology demonstration project conducted under title II, section 101(d) of the Further Continuing Appropriations Act of 1985 (sec. 5903(d) of title 42 of the United States Code), or subsequent appropriations, up to a total amount of \$2,500,000,000 for commercial demonstration of clean coal technology, or similar projects funded through appropriations for the Environmental Protection Agency; or

(iv) A permanent clean coal technology demonstration project that constitutes a repowering project.

(33) *Representative actual annual emissions* means the average rate, in tons per year, at which the source is projected to emit a pollutant for the two-year period after a physical change or change in the method of operation of a unit, (or a different consecutive two-year period within 10 years after that change, where the Administrator determines that such period is more representative of normal source operations), considering the effect any such change will have on increasing or decreasing the hourly emissions rate and on projected capacity utilization. In projecting future emissions the Administrator shall:

(i) Consider all relevant information, including but not limited to, historical operational data, the company's own representations, filings with the State or Federal regulatory authorities, and compliance plans under title IV of the Clean Air Act; and

(ii) Exclude, in calculating any increase in emissions that results from the particular physical change or change in the method of operation at an electric utility steam generating unit, that portion of the unit's emissions following the change that could have been accommodated during the representative baseline period and is attributable to an increase in projected capacity utilization at the unit that is unrelated to the particular change, including any increased utilization due to the rate of electricity demand growth for the utility system as a whole.

(34) *Clean coal technology* means any technology, including technologies applied at the precombustion, combustion, or post combustion stage, at a new or existing facility which will achieve significant reductions in air emissions of sulfur dioxide or oxides of nitrogen associated with the utilization of coal in the generation of electricity, or process steam which was not in widespread use as of November 15, 1990.

(35) *Clean coal technology demonstration project* means a project using funds appropriated under the heading "Department of Energy-Clean Coal Technology", up to a total amount of \$2,500,000,000 for commercial demonstration of clean coal technology, or similar projects funded through appropriations for the Environmental Protection Agency. The Federal contribution for a qualifying project shall be at least 20 percent of the total cost of the demonstration project.

(36) *Temporary clean coal technology demonstration project* means a clean coal technology demonstration project that is operated for a period of 5 years or less, and which complies with the State implementation plans for the State in which the project is located and other requirements necessary to attain and maintain the national ambient air quality standards during the project and after it is terminated.

(37) (i) *Repowering* means replacement of an existing coal-fired boiler with one of the following clean coal technologies: atmospheric or pressurized fluidized bed combustion, integrated gasification combined cycle, magnetohydrodynamics, direct and indirect coal-fired turbines, integrated gasification fuel cells, or as determined by the Administrator, in consultation with the Secretary of Energy, a derivative of one or more of these technologies, and any other technology capable of controlling multiple combustion emissions simultaneously with improved boiler or generation efficiency and with significantly greater waste reduction relative to the performance of technology in widespread commercial use as of November 15, 1990.

(ii) Repowering shall also include any oil and/or gas-fired unit which has been awarded clean coal technology dem-

onstration funding as of January 1, 1991, by the Department of Energy.

(iii) The Administrator shall give expedited consideration to permit applications for any source that satisfies the requirements of this subsection and is granted an extension under section 409 of the Clean Air Act.

(38) *Reactivation of a very clean coal-fired electric utility steam generating unit* means any physical change or change in the method of operation associated with the commencement of commercial operations by a coal-fired utility unit after a period of discontinued operation where the unit:

(i) Has not been in operation for the two-year period prior to the enactment of the Clean Air Act Amendments of 1990, and the emissions from such unit continue to be carried in the permitting authority's emissions inventory at the time of enactment;

(ii) Was equipped prior to shut-down with a continuous system of emissions control that achieves a removal efficiency for sulfur dioxide of no less than 85 percent and a removal efficiency for particulates of no less than 98 percent;

(iii) Is equipped with low-NO_x burners prior to the time of commencement of operations following reactivation; and

(iv) Is otherwise in compliance with the requirements of the Clean Air Act.

(c) *Ambient air increments*. In areas designated as Class I, II or III, increases in pollutant concentration over the baseline concentration shall be limited to the following:

| Pollutant | Maximum allowable increase (micrograms per cubic meter) |
|-------------------------------------|---|
| Class I | |
| Particulate matter: | |
| PM-10, annual arithmetic mean | 4 |
| PM-10, 24-hr maximum | 8 |
| Sulfur dioxide: | |
| Annual arithmetic mean | 2 |
| 24-hr maximum | 5 |
| 3-hr maximum | 25 |
| Nitrogen dioxide: | |
| Annual arithmetic mean | 2.5 |
| Class II | |
| Particulate matter: | |
| PM-10, annual arithmetic mean | 17 |
| PM-10, 24-hr maximum | 30 |

| Pollutant | Maximum allowable increase (micrograms per cubic meter) |
|-------------------------------------|---|
| Sulfur dioxide: | |
| Annual arithmetic mean | 20 |
| 24-hr maximum | 91 |
| 3-hr maximum | 612 |
| Nitrogen dioxide: | |
| Annual arithmetic mean | 25 |
| Class III | |
| Particulate matter | |
| PM-10, annual arithmetic mean | 34 |
| PM-10, 24-hr maximum | 60 |
| Sulfur dioxide: | |
| Annual arithmetic mean | 40 |
| 24-hr maximum | 182 |
| 3-hr maximum | 700 |
| Nitrogen dioxide: | |
| Annual arithmetic mean | 50 |

For any period other than an annual period, the applicable maximum allowable increase may be exceeded during one such period per year at any one location.

(d) *Ambient air ceilings.* No concentration of a pollutant shall exceed:

(1) The concentration permitted under the national secondary ambient air quality standard, or

(2) The concentration permitted under the national primary ambient air quality standard, whichever concentration is lowest for the pollutant for a period of exposure.

(e) *Restrictions on area classifications.*

(1) All of the following areas which were in existence on August 7, 1977, shall be Class I areas and may not be redesignated:

(i) International parks,

(ii) National wilderness areas which exceed 5,000 acres in size,

(iii) National memorial parks which exceed 5,000 acres in size, and

(iv) National parks which exceed 6,000 acres in size.

(2) Areas which were redesignated as Class I under regulations promulgated before August 7, 1977, shall remain Class I, but may be redesignated as provided in this section.

(3) Any other area, unless otherwise specified in the legislation creating such an area, is initially designated Class II, but may be redesignated as provided in this section.

(4) The following areas may be redesignated only as Class I or II:

(i) An area which as of August 7, 1977, exceeded 10,000 acres in size and was a national monument, a national primitive area, a national preserve, a national recreational area, a national wild and scenic river, a national wildlife refuge, a national lakeshore or seashore; and

(ii) A national park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres in size.

(f) [Reserved]

(g) *Redesignation.* (1) All areas (except as otherwise provided under paragraph (e) of this section) are designated Class II as of December 5, 1974. Redesignation (except as otherwise precluded by paragraph (e) of this section) may be proposed by the respective States or Indian Governing Bodies, as provided below, subject to approval by the Administrator as a revision to the applicable State implementation plan.

(2) The State may submit to the Administrator a proposal to redesignate areas of the State Class I or Class II provided that:

(i) At least one public hearing has been held in accordance with procedures established in § 51.102 of this chapter;

(ii) Other States, Indian Governing Bodies, and Federal Land Managers whose lands may be affected by the proposed redesignation were notified at least 30 days prior to the public hearing;

(iii) A discussion of the reasons for the proposed redesignation, including a satisfactory description and analysis of the health, environmental, economic, social and energy effects of the proposed redesignation, was prepared and made available for public inspection at least 30 days prior to the hearing and the notice announcing the hearing contained appropriate notification of the availability of such discussion;

(iv) Prior to the issuance of notice respecting the redesignation of an area that includes any Federal lands, the State has provided written notice to the appropriate Federal Land Manager and afforded adequate opportunity (not in excess of 60 days) to confer with the State respecting the redesignation and to submit written comments and recommendations. In redesignating any area with respect to which any Federal

Land Manager had submitted written comments and recommendations, the State shall have published a list of any inconsistency between such redesignation and such comments and recommendations (together with the reasons for making such redesignation against the recommendation of the Federal Land Manager); and

(v) The State has proposed the redesignation after consultation with the elected leadership of local and other substate general purpose governments in the area covered by the proposed redesignation.

(3) Any area other than an area to which paragraph (e) of this section refers may be redesignated as Class III if—

(i) The redesignation would meet the requirements of paragraph (g)(2) of this section;

(ii) The redesignation, except any established by an Indian Governing Body, has been specifically approved by the Governor of the State, after consultation with the appropriate committees of the legislature, if it is in session, or with the leadership of the legislature, if it is not in session (unless State law provides that the redesignation must be specifically approved by State legislation) and if general purpose units of local government representing a majority of the residents of the area to be redesignated enact legislation or pass resolutions concurring in the redesignation;

(iii) The redesignation would not cause, or contribute to, a concentration of any air pollutant which would exceed any maximum allowable increase permitted under the classification of any other area or any national ambient air quality standard; and

(iv) Any permit application for any major stationary source or major modification, subject to review under paragraph (l) of this section, which could receive a permit under this section only if the area in question were redesignated as Class III, and any material submitted as part of that application, were available insofar as was practicable for public inspection prior to any public hearing on redesignation of the area as Class III.

(4) Lands within the exterior boundaries of Indian Reservations may be re-

designated only by the appropriate Indian Governing Body. The appropriate Indian Governing Body may submit to the Administrator a proposal to redesignate areas Class I, Class II, or Class III: *Provided, That:*

(i) The Indian Governing Body has followed procedures equivalent to those required of a State under paragraphs (g)(2), (g)(3)(iii), and (g)(3)(iv) of this section; and

(ii) Such redesignation is proposed after consultation with the State(s) in which the Indian Reservation is located and which border the Indian Reservation.

(5) The Administrator shall disapprove, within 90 days of submission, a proposed redesignation of any area only if he finds, after notice and opportunity for public hearing, that such redesignation does not meet the procedural requirements of this paragraph or is inconsistent with paragraph (e) of this section. If any such disapproval occurs, the classification of the area shall be that which was in effect prior to the redesignation which was disapproved.

(6) If the Administrator disapproves any proposed redesignation, the State or Indian Governing Body, as appropriate, may resubmit the proposal after correcting the deficiencies noted by the Administrator.

(h) *Stack heights.* (1) The degree of emission limitation required for control of any air pollutant under this section shall not be affected in any manner by—

(i) So much of the stack height of any source as exceeds good engineering practice, or

(ii) Any other dispersion technique.

(2) Paragraph (h)(1) of this section shall not apply with respect to stack heights in existence before December 31, 1970, or to dispersion techniques implemented before then.

(l) *Review of major stationary sources and major modifications—Source applicability and exemptions.* (1) No stationary source or modification to which the requirements of paragraphs (j) through (r) of this section apply shall begin actual construction without a permit which states that the stationary source

or modification would meet those requirements. The Administrator has authority to issue any such permit.

(2) The requirements of paragraphs (j) through (r) of this section shall apply to any major stationary source and any major modification with respect to each pollutant subject to regulation under the Act that it would emit, except as this section otherwise provides.

(3) The requirements of paragraphs (j) through (r) of this section apply only to any major stationary source or major modification that would be constructed in an area designated as attainment or unclassifiable under section 107(d)(1)(D) or (E) of the Act.

(4) The requirements of paragraphs (j) through (r) of this section shall not apply to a particular major stationary source or major modification, if:

(i) Construction commenced on the source or modification before August 7, 1977. The regulations at 40 CFR 52.21 as in effect before August 7, 1977, shall govern the review and permitting of any such source or modification; or

(ii) The source or modification was subject to the review requirements of 40 CFR 52.21(d)(1) as in effect before March 1, 1978, and the owner or operator:

(a) Obtained under 40 CFR 52.21 a final approval effective before March 1, 1978;

(b) Commenced construction before March 19, 1979; and

(c) Did not discontinue construction for a period of 18 months or more and completed construction within a reasonable time; or

(iii) The source or modification was subject to 40 CFR 52.21 as in effect before March 1, 1978, and the review of an application for approval for the stationary source or modification under 40 CFR 52.21 would have been completed by March 1, 1978, but for an extension of the public comment period pursuant to a request for such an extension. In such a case, the application shall continue to be processed, and granted or denied, under 40 CFR 52.21 as in effect prior to March 1, 1978; or

(iv) The source or modification was not subject to 40 CFR 52.21 as in effect before March 1, 1978, and the owner or operator:

(a) Obtained all final Federal, state and local preconstruction approvals or permits necessary under the applicable State Implementation Plan before March 1, 1978;

(b) Commenced construction before March 19, 1979; and

(c) Did not discontinue construction for a period of 18 months or more and completed construction within a reasonable time; or

(v) The source or modification was not subject to 40 CFR 52.21 as in effect on June 19, 1978 or under the partial stay of regulations published on February 5, 1980 (45 FR 7800), and the owner or operator:

(a) Obtained all final Federal, state and local preconstruction approvals or permits necessary under the applicable State Implementation Plan before August 7, 1980;

(b) Commenced construction within 18 months from August 7, 1980, or any earlier time required under the applicable State Implementation Plan; and

(c) Did not discontinue construction for a period of 18 months or more and completed construction within a reasonable time; or

(vi) The source or modification would be a nonprofit health or nonprofit educational institution, or a major modification would occur at such an institution, and the governor of the state in which the source or modification would be located requests that it be exempt from those requirements; or

(vii) The source or modification would be a major stationary source or major modification only if fugitive emissions, to the extent quantifiable, are considered in calculating the potential to emit of the stationary source or modification and the source does not belong to any of the following categories:

(a) Coal cleaning plants (with thermal dryers);

(b) Kraft pulp mills;

(c) Portland cement plants;

(d) Primary zinc smelters;

(e) Iron and steel mills;

(f) Primary aluminum ore reduction plants;

(g) Primary copper smelters;

(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;

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- (i) Hydrofluoric, sulfuric, or nitric acid plants;
- (j) Petroleum refineries;
- (k) Lime plants;
- (l) Phosphate rock processing plants;
- (m) Coke oven batteries;
- (n) Sulfur recovery plants;
- (o) Carbon black plants (furnace process);
- (p) Primary lead smelters;
- (q) Fuel conversion plants;
- (r) Sintering plants;
- (s) Secondary metal production plants;
- (t) Chemical process plants;
- (u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
- (v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
- (w) Taconite ore processing plants;
- (x) Glass fiber processing plants;
- (y) Charcoal production plants;
- (z) Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input;
- (aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act; or
- (viii) The source is a portable stationary source which has previously received a permit under this section, and
 - (a) The owner or operator proposes to relocate the source and emissions of the source at the new location would be temporary; and
 - (b) The emissions from the source would not exceed its allowable emissions; and
 - (c) The emissions from the source would impact no Class I area and no area where an applicable increment is known to be violated; and
 - (d) Reasonable notice is given to the Administrator prior to the relocation identifying the proposed new location and the probable duration of operation at the new location. Such notice shall be given to the Administrator not less than 10 days in advance of the proposed relocation unless a different time duration is previously approved by the Administrator.
 - (ix) The source or modification was not subject to § 52.21, with respect to particulate matter, as in effect before July 31, 1987, and the owner or operator:
 - (a) Obtained all final Federal, State, and local preconstruction approvals or permits necessary under the applicable State implementation plan before July 31, 1987;
 - (b) Commenced construction within 18 months after July 31, 1987, or any earlier time required under the State implementation plan; and
 - (c) Did not discontinue construction for a period of 18 months or more and completed construction within a reasonable period of time.
 - (x) The source or modification was subject to 40 CFR 52.21, with respect to particulate matter, as in effect before July 31, 1987 and the owner or operator submitted an application for a permit under this section before that date, and the Administrator subsequently determines that the application as submitted was complete with respect to the particular matter requirements then in effect in the section. Instead, the requirements of paragraphs (j) through (r) of this section that were in effect before July 31, 1987 shall apply to such source or modification.
 - (5) The requirements of paragraphs (j) through (r) of this section shall not apply to a major stationary source or major modification with respect to a particular pollutant if the owner or operator demonstrates that, as to that pollutant, the source or modification is located in an area designated as non-attainment under section 107 of the Act.
 - (6) The requirements of paragraphs (k), (m) and (o) of this section shall not apply to a major stationary source or major modification with respect to a particular pollutant, if the allowable emissions of that pollutant from the source, or the net emissions increase of that pollutant from the modification:
 - (i) Would impact no Class I area and no area where an applicable increment is known to be violated, and
 - (ii) Would be temporary.
 - (7) The requirements of paragraphs (k), (m) and (o) of this section as they relate to any maximum allowable increase for a Class II area shall not apply to a major modification at a stationary source that was in existence on

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March 1, 1978, if the net increase in allowable emissions of each pollutant subject to regulation under the Act from the modification after the application of best available control technology would be less than 50 tons per year.

(8) The Administrator may exempt a stationary source or modification from the requirements of paragraph (m) of this section, with respect to monitoring for a particular pollutant if:

(i) The emissions increase of the pollutant from the new source or the net emissions increase of the pollutant from the modification would cause, in any area, air quality impacts less than the following amounts:

Carbon monoxide—575 $\mu\text{g}/\text{m}^3$, 8-hour average;
Nitrogen dioxide—14 $\mu\text{g}/\text{m}^3$, annual average;
Particulate matter—10 $\mu\text{g}/\text{m}^3$ of PM-10, 24-hour average;
Sulfur dioxide—13 $\mu\text{g}/\text{m}^3$, 24-hour average;
Ozone:¹
Lead—0.1 $\mu\text{g}/\text{m}^3$, 3-month average;
Mercury—0.25 $\mu\text{g}/\text{m}^3$, 24-hour average;
Beryllium—0.001 $\mu\text{g}/\text{m}^3$, 24-hour average;
Fluorides—0.25 $\mu\text{g}/\text{m}^3$, 24-hour average;
Vinyl chloride—15 $\mu\text{g}/\text{m}^3$, 24-hour average;
Total reduced sulfur—10 $\mu\text{g}/\text{m}^3$, 1-hour average;
Hydrogen sulfide—0.2 $\mu\text{g}/\text{m}^3$, 1-hour average;
Reduced sulfur compounds—10 $\mu\text{g}/\text{m}^3$, 1-hour average; or

(ii) The concentrations of the pollutant in the area that the source or modification would affect are less than the concentrations listed in paragraph (i)(8)(i) of this section, or the pollutant is not listed in paragraph (i)(8)(i) of this section.

(9) The requirements for best available control technology in paragraph (j) of this section and the requirements for air quality analyses in paragraph (m)(1) of this section, shall not apply to a particular stationary source or modification that was subject to 40 CFR 52.21 as in effect on June 19, 1978, if the owner or operator of the source or modification submitted an application for a permit under those regulations

¹ No *de minimis* air quality level is provided for ozone. However, any net increase of 100 tons per year or more of volatile organic compounds subject to PSD would be required to perform an ambient impact analysis including the gathering of ambient air quality data.

before August 7, 1980, and the Administrator subsequently determines that the application as submitted before that date was complete. Instead, the requirements at 40 CFR 52.21(j) and (n) as in effect on June 19, 1978 apply to any such source or modification.

(10)(i) The requirements for air quality monitoring in paragraphs (m)(1)(ii) through (iv) of this section shall not apply to a particular source or modification that was subject to 40 CFR 52.21 as in effect on June 19, 1978, if the owner or operator of the source or modification submits an application for a permit under this section on or before June 8, 1981, and the Administrator subsequently determines that the application as submitted before that date was complete with respect to the requirements of this section other than those in paragraphs (m)(1)(ii) through (iv) of this section, and with respect to the requirements for such analyses at 40 CFR 52.21(m)(2) as in effect on June 19, 1978. Instead, the latter requirements shall apply to any such source or modification.

(ii) The requirements for air quality monitoring in paragraphs (m)(1)(ii) through (iv) of this section shall not apply to a particular source or modification that was not subject to 40 CFR 52.21 as in effect on June 19, 1978, if the owner or operator of the source or modification submits an application for a permit under this section on or before June 8, 1981, and the Administrator subsequently determines that the application as submitted before that date was complete, except with respect to the requirements in paragraphs (m)(1)(ii) through (iv).

(iii) At the discretion of the Administrator, the requirements for air quality monitoring of PM₁₀ in paragraphs (m)(1)(i)–(iv) of this section may not apply to a particular source or modification when the owner or operator of the source or modification submits an application for a permit under this section on or before June 1, 1988 and the Administrator subsequently determines that the application as submitted before that date was complete, except with respect to the requirements for monitoring particulate matter in paragraphs (m)(1)(i)–(iv).

(ii) The requirements for air quality monitoring of PM_{10} in paragraphs (m)(1), (ii) and (iv) and (m)(3) of this section shall apply to a particular source or modification if the owner or operator of the source or modification submits an application for a permit under this section after June 1, 1988 and no later than December 1, 1988. The data shall have been gathered over at least the period from February 1, 1988 to the date the application becomes otherwise complete in accordance with the provisions set forth under paragraph (m)(1)(viii) of this section, except that if the Administrator determines that a complete and adequate analysis can be accomplished with monitoring data over a shorter period (not to be less than 4 months), the data that paragraph (m)(1)(iii) requires shall have been gathered over a shorter period.

(12) The requirements of paragraph (k)(2) of this section shall not apply to a stationary source or modification with respect to any maximum allowable increase for nitrogen oxides if the owner or operator of the source or modification submitted an application for a permit under this section before the provisions embodying the maximum allowable increase took effect as part of the applicable implementation plan and the Administrator subsequently determined that the application as submitted before that date was complete.

(13) The requirements in paragraph (k)(2) of this section shall not apply to a stationary source or modification with respect to any maximum allowable increase for PM_{10} if (i) the owner or operator of the source or modification submitted an application for a permit under this section before the provisions embodying the maximum allowable increases for PM_{10} took effect in an implementation plan to which this section applies, and (ii) the Administrator subsequently determined that the application as submitted before that date was otherwise complete. Instead, the requirements in paragraph (k)(2) shall apply with respect to the maximum allowable increases for TSP as in effect on the date the application was submitted.

(j) *Control technology review.* (1) A major stationary source or major

modification shall meet each applicable emissions limitation under the State Implementation Plan and each applicable emissions standard and standard of performance under 40 CFR parts 60 and 61.

(2) A new major stationary source shall apply best available control technology for each pollutant subject to regulation under the Act that it would have the potential to emit in significant amounts.

(3) A major modification shall apply best available control technology for each pollutant subject to regulation under the Act for which it would result in a significant net emissions increase at the source. This requirement applies to each proposed emissions unit at which a net emissions increase in the pollutant would occur as a result of a physical change or change in the method of operation in the unit.

(4) For phased construction projects, the determination of best available control technology shall be reviewed and modified as appropriate at the latest reasonable time which occurs no later than 18 months prior to commencement of construction of each independent phase of the project. At such time, the owner or operator of the applicable stationary source may be required to demonstrate the adequacy of any previous determination of best available control technology for the source.

(k) *Source impact analysis.* The owner or operator of the proposed source or modification shall demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reductions (including secondary emissions), would not cause or contribute to air pollution in violation of:

(1) Any national ambient air quality standard in any air quality control region; or

(2) Any applicable maximum allowable increase over the baseline concentration in any area.

(l) *Air quality models.* (1) All estimates of ambient concentrations required under this paragraph shall be based on applicable air quality models, data bases, and other requirements specified

in appendix W of part 51 of this chapter (Guideline on Air Quality Models).

(2) Where an air quality model specified in appendix W of part 51 of this chapter (Guideline on Air Quality Models) is inappropriate, the model may be modified or another model substituted. Such a modification or substitution of a model may be made on a case-by-case basis or, where appropriate, on a generic basis for a specific state program. Written approval of the Administrator must be obtained for any modification or substitution. In addition, use of a modified or substituted model must be subject to notice and opportunity for public comment under procedures developed in accordance with paragraph (g) of this section.

(m) *Air quality analysis*—(1) *Preapplication analysis*. (i) Any application for a permit under this section shall contain an analysis of ambient air quality in the area that the major stationary source or major modification would affect for each of the following pollutants:

(a) For the source, each pollutant that it would have the potential to omit in a significant amount;

(b) For the modification, each pollutant for which it would result in a significant net emissions increase.

(ii) With respect to any such pollutant for which no National Ambient Air Quality Standard exists, the analysis shall contain such air quality monitoring data as the Administrator determines is necessary to assess ambient air quality for that pollutant in any area that the emissions of that pollutant would affect.

(iii) With respect to any such pollutant (other than nonmethane hydrocarbons) for which such a standard does exist, the analysis shall contain continuous air quality monitoring data gathered for purposes of determining whether emissions of that pollutant would cause or contribute to a violation of the standard or any maximum allowable increase.

(iv) In general, the continuous air quality monitoring data that is required shall have been gathered over a period of at least one year and shall represent at least the year preceding receipt of the application, except that, if the Administrator determines that a

complete and adequate analysis can be accomplished with monitoring data gathered over a period shorter than one year (but not to be less than four months), the data that is required shall have been gathered over at least that shorter period.

(v) For any application which becomes complete, except as to the requirements of paragraphs (m)(1) (iii) and (iv) of this section, between June 8, 1981, and February 9, 1982, the data that paragraph (m)(1)(iii) of this section, requires shall have been gathered over at least the period from February 9, 1981, to the date the application becomes otherwise complete, except that:

(a) If the source or modification would have been major for that pollutant under 40 CFR 52.21 as in effect on June 19, 1978, any monitoring data shall have been gathered over at least the period required by those regulations.

(b) If the Administrator determines that a complete and adequate analysis can be accomplished with monitoring data over a shorter period (not to be less than four months), the data that paragraph (m)(1)(iii) of this section, requires shall have been gathered over at least that shorter period.

(c) If the monitoring data would relate exclusively to ozone and would not have been required under 40 CFR 52.21 as in effect on June 19, 1978, the Administrator may waive the otherwise applicable requirements of this paragraph (v) to the extent that the applicant shows that the monitoring data would be unrepresentative of air quality over a full year.

(vi) The owner or operator of a proposed stationary source or modification of volatile organic compounds who satisfies all conditions of 40 CFR part 51 Appendix S, section IV may provide post-approval monitoring data for ozone in lieu of providing preconstruction data as required under paragraph (m)(1) of this section.

(vii) For any application that becomes complete, except as to the requirements of paragraphs (m)(1) (iii) and (iv) pertaining to PM₁₀, after December 1, 1988 and no later than August 1, 1989 the data that paragraph (m)(1)(iii) requires shall have been gathered over at least the period from

August 1, 1988 to the date the application becomes otherwise complete, except that if the Administrator determines that a complete and adequate analysis can be accomplished with monitoring data over a shorter period (not to be less than 4 months), the data that paragraph (m)(1)(iii) requires shall have been gathered over that shorter period.

(viii) With respect to any requirements for air quality monitoring of PM_{10} under paragraphs (i)(11) (i) and (ii) of this section the owner or operator of the source or modification shall use a monitoring method approved by the Administrator and shall estimate the ambient concentrations of PM_{10} using the data collected by such approved monitoring method in accordance with estimating procedures approved by the Administrator.

(2) Post-construction monitoring. The owner or operator of a major stationary source or major modification shall, after construction of the stationary source or modification, conduct such ambient monitoring as the Administrator determines is necessary to determine the effect emissions from the stationary source or modification may have, or are having, on air quality in any area.

(3) Operations of monitoring stations. The owner or operator of a major stationary source or major modification shall meet the requirements of Appendix B to part 58 of this chapter during the operation of monitoring stations for purposes of satisfying paragraph (m) of this section.

(n) *Source information.* The owner or operator of a proposed source or modification shall submit all information necessary to perform any analysis or make any determination required under this section.

(1) With respect to a source or modification to which paragraphs (j), (l), (n) and (p) of this section apply, such information shall include:

(i) A description of the nature, location, design capacity, and typical operating schedule of the source or modification, including specifications and drawings showing its design and plant layout;

(ii) A detailed schedule for construction of the source or modification;

(iii) A detailed description as to what system of continuous emission reduction is planned for the source or modification, emission estimates, and any other information necessary to determine that best available control technology would be applied.

(2) Upon request of the Administrator, the owner or operator shall also provide information on:

(i) The air quality impact of the source or modification, including meteorological and topographical data necessary to estimate such impact; and

(ii) The air quality impacts, and the nature and extent of any or all general commercial, residential, industrial, and other growth which has occurred since August 7, 1977, in the area the source or modification would affect.

(o) *Additional impact analyses.* (1) The owner or operator shall provide an analysis of the impairment to visibility, soils and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial and other growth associated with the source or modification. The owner or operator need not provide an analysis of the impact on vegetation having no significant commercial or recreational value.

(2) The owner or operator shall provide an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the source or modification.

(3) *Visibility monitoring.* The Administrator may require monitoring of visibility in any Federal class I area near the proposed new stationary source for major modification for such purposes and by such means as the Administrator deems necessary and appropriate.

(p) *Sources impacting Federal Class I areas—additional requirements—(1) Notice to Federal land managers.* The Administrator shall provide written notice of any permit application for a proposed major stationary source or major modification, the emissions from which may affect a Class I area, to the Federal land manager and the Federal official charged with direct responsibility for management of any lands

within any such area. Such notification shall include a copy of all information relevant to the permit application and shall be given within 30 days of receipt and at least 60 days prior to any public hearing on the application for a permit to construct. Such notification shall include an analysis of the proposed source's anticipated impacts on visibility in the Federal Class I area. The Administrator shall also provide the Federal land manager and such Federal officials with a copy of the preliminary determination required under paragraph (q) of this section, and shall make available to them any materials used in making that determination, promptly after the Administrator makes such determination. Finally, the Administrator shall also notify all affected Federal land managers within 30 days of receipt of any advance notification of any such permit application.

(2) *Federal Land Manager.* The Federal Land Manager and the Federal official charged with direct responsibility for management of such lands have an affirmative responsibility to protect the air quality related values (including visibility) of such lands and to consider, in consultation with the Administrator, whether a proposed source or modification will have an adverse impact on such values.

(3) *Visibility analysis.* The Administrator shall consider any analysis performed by the Federal land manager, provided within 30 days of the notification required by paragraph (p)(1) of this section, that shows that a proposed new major stationary source or major modification may have an adverse impact on visibility in any Federal Class I area. Where the Administrator finds that such an analysis does not demonstrate to the satisfaction of the Administrator that an adverse impact on visibility will result in the Federal Class I area, the Administrator must, in the notice of public hearing on the permit application, either explain his decision or give notice as to where the explanation can be obtained.

(4) *Denial—impact on air quality related values.* The Federal Land Manager of any such lands may demonstrate to the Administrator that the emissions from a proposed source or modification

would have an adverse impact on the air quality-related values (including visibility) of those lands, notwithstanding that the change in air quality resulting from emissions from such source or modification would not cause or contribute to concentrations which would exceed the maximum allowable increases for a Class I area. If the Administrator concurs with such demonstration, then he shall not issue the permit.

(5) *Class I variances.* The owner or operator of a proposed source or modification may demonstrate to the Federal Land Manager that the emissions from such source or modification would have no adverse impact on the air quality related values of any such lands (including visibility), notwithstanding that the change in air quality resulting from emissions from such source or modification would cause or contribute to concentrations which would exceed the maximum allowable increases for a Class I area. If the Federal land manager concurs with such demonstration and he so certifies, the State may authorize the Administrator: *Provided*, That the applicable requirements of this section are otherwise met, to issue the permit with such emission limitations as may be necessary to assure that emissions of sulfur dioxide, particulate matter, and nitrogen oxides would not exceed the following maximum allowable increases over minor source baseline concentration for such pollutants:

| Pollutant | Maximum allowable increase (micrograms per cubic meter) |
|-------------------------------------|---|
| Particulate matter: | |
| PM-10, annual arithmetic mean | 17 |
| PM-10, 24-hr maximum | 30 |
| Sulfur dioxide: | |
| Annual arithmetic mean | 20 |
| 24-hr maximum | 81 |
| 3-hr maximum | 325 |
| Nitrogen dioxide: | |
| Annual arithmetic mean | 25 |

(6) *Sulfur dioxide variance by Governor with Federal Land Manager's concurrence.* The owner or operator of a proposed source or modification which cannot be approved under paragraph (q)(4) of this section may demonstrate to the Governor that the source cannot

be constructed by reason of any maximum allowable increase for sulfur dioxide for a period of twenty-four hours or less applicable to any Class I area and, in the case of Federal mandatory Class I areas, that a variance under this clause would not adversely affect the air quality related values of the area (including visibility). The Governor, after consideration of the Federal Land Manager's recommendation (if any) and subject to his concurrence, may, after notice and public hearing, grant a variance from such maximum allowable increase. If such variance is granted, the Administrator shall issue a permit to such source or modification pursuant to the requirements of paragraph (q)(7) of this section: *Provided*, That the applicable requirements of this section are otherwise met.

(7) *Variance by the Governor with the President's concurrence.* In any case where the Governor recommends a variance in which the Federal Land Manager does not concur, the recommendations of the Governor and the Federal Land Manager shall be transmitted to the President. The President may approve the Governor's recommendation if he finds that the variance is in the national interest. If the variance is approved, the Administrator shall issue a permit pursuant to the requirements of paragraph (q)(7) of this section: *Provided*, That the applicable requirements of this section are otherwise met.

(8) *Emission limitations for Presidential or gubernatorial variance.* In the case of a permit issued pursuant to paragraph (q) (5) or (6) of this section the source or modification shall comply with such emission limitations as may be necessary to assure that emissions of sulfur dioxide from the source or modification would not (during any day on which the otherwise applicable maximum allowable increases are exceeded) cause or contribute to concentrations which would exceed the following maximum allowable increases over the baseline concentration and to assure that such emissions would not cause or contribute to concentrations which exceed the otherwise applicable maximum allowable increases for periods of exposure of 24 hours or less for more

than 18 days, not necessarily consecutive, during any annual period:

MAXIMUM ALLOWABLE INCREASE
(Micrograms per cubic meter)

| Period of exposure | Terrain areas | |
|---------------------|---------------|------|
| | Low | High |
| 24-hr maximum | 38 | 62 |
| 3-hr maximum | 130 | 221 |

(q) *Public participation.* The Administrator shall follow the applicable procedures of 40 CFR part 124 in processing applications under this section. The Administrator shall follow the procedures at 40 CFR 52.21(r) as in effect on June 19, 1979, to the extent that the procedures of 40 CFR part 124 do not apply.

(r) *Source obligation.* (1) Any owner or operator who constructs or operates a source or modification not in accordance with the application submitted pursuant to this section or with the terms of any approval to construct, or any owner or operator of a source or modification subject to this section who commences construction after the effective date of these regulations without applying for and receiving approval hereunder, shall be subject to appropriate enforcement action.

(2) Approval to construct shall become invalid if construction is not commenced within 18 months after receipt of such approval, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The Administrator may extend the 18-month period upon a satisfactory showing that an extension is justified. This provision does not apply to the time period between construction of the approved phases of a phased construction project; each phase must commence construction within 18 months of the projected and approved commencement date.

(3) Approval to construct shall not relieve any owner or operator of the responsibility to comply fully with applicable provisions of the State implementation plan and any other requirements under local, State, or Federal law.

(4) At such time that a particular source or modification becomes a

major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements or paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification.

(s) *Environmental impact statements.* Whenever any proposed source or modification is subject to action by a Federal Agency which might necessitate preparation of an environmental impact statement pursuant to the National Environmental Policy Act (42 U.S.C. 4321), review by the Administrator conducted pursuant to this section shall be coordinated with the broad environmental reviews under that Act and under section 309 of the Clean Air Act to the maximum extent feasible and reasonable.

(t) *Disputed permits or redesignations.* If any State affected by the redesignation of an area by an Indian Governing Body, or any Indian Governing Body of a tribe affected by the redesignation of an area by a State, disagrees with such redesignation, or if a permit is proposed to be issued for any major stationary source or major modification proposed for construction in any State which the Governor of an affected State or Indian Governing Body of an affected tribe determines will cause or contribute to a cumulative change in air quality in excess of that allowed in this part within the affected State or Indian Reservation, the Governor or Indian Governing Body may request the Administrator to enter into negotiations with the parties involved to resolve such dispute. If requested by any State or Indian Governing Body involved, the Administrator shall make a recommendation to resolve the dispute and protect the air quality related values of the lands involved. If the parties involved do not reach agreement, the Administrator shall resolve the dispute and his determination, or the results of agreements reached through other means, shall become part of the applicable State implementation plan and

shall be enforceable as part of such plan. In resolving such disputes relating to area redesignation, the Administrator shall consider the extent to which the lands involved are of sufficient size to allow effective air quality management or have air quality related values of such an area.

(u) *Delegation of authority.* (1) The Administrator shall have the authority to delegate his responsibility for conducting source review pursuant to this section, in accordance with paragraphs (v) (2) and (3) of this section.

(2) Where the Administrator delegates the responsibility for conducting source review under this section to any agency other than a Regional Office of the Environmental Protection Agency, the following provisions shall apply:

(i) Where the delegate agency is not an air pollution control agency, it shall consult with the appropriate State and local air pollution control agency prior to making any determination under this section. Similarly, where the delegate agency does not have continuing responsibility for managing land use, it shall consult with the appropriate State and local agency primarily responsible for managing land use prior to making any determination under this section.

(ii) The delegate agency shall send a copy of any public comment notice required under paragraph (r) of this section to the Administrator through the appropriate Regional Office.

(3) The Administrator's authority for reviewing a source or modification located on an Indian Reservation shall not be redelegated other than to a Regional Office of the Environmental Protection Agency, except where the State has assumed jurisdiction over such land under other laws. Where the State has assumed such jurisdiction, the Administrator may delegate his authority to the States in accordance with paragraph (v)(2) of this section.

(4) In the case of a source or modification which proposes to construct in a class III area, emissions from which would cause or contribute to air quality exceeding the maximum allowable increase applicable if the area were designated a class II area, and where no standard under section 111 of the act has been promulgated for such source

category, the Administrator must approve the determination of best available control technology as set forth in the permit.

(v) *Innovative control technology.* (1) An owner or operator of a proposed major stationary source or major modification may request the Administrator in writing no later than the close of the comment period under 40 CFR 124.10 to approve a system of innovative control technology.

(2) The Administrator shall, with the consent of the governor(s) of the affected state(s), determine that the source or modification may employ a system of innovative control technology, if:—

(i) The proposed control system would not cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function;

(ii) The owner or operator agrees to achieve a level of continuous emissions reduction equivalent to that which would have been required under paragraph (j)(2) of this section, by a date specified by the Administrator. Such date shall not be later than 4 years from the time of startup or 7 years from permit issuance;

(iii) The source or modification would meet the requirements of paragraphs (j) and (k) of this section, based on the emissions rate that the stationary source employing the system of innovative control technology would be required to meet on the date specified by the Administrator;

(iv) The source or modification would not before the date specified by the Administrator:

(a) Cause or contribute to a violation of an applicable national ambient air quality standard; or

(b) Impact any area where an applicable increment is known to be violated; and

(v) All other applicable requirements including those for public participation have been met.

(vi) The provisions of paragraph (p) of this section (relating to Class I areas) have been satisfied with respect to all periods during the life of the source or modification.

(3) The Administrator shall withdraw any approval to employ a system of in-

novative control technology made under this section, if:

(i) The proposed system fails by the specified date to achieve the required continuous emissions reduction rate; or

(ii) The proposed system fails before the specified date so as to contribute to an unreasonable risk to public health, welfare, or safety; or

(iii) The Administrator decides at any time that the proposed system is unlikely to achieve the required level of control or to protect the public health, welfare, or safety.

(4) If a source or modification fails to meet the required level of continuous emission reduction within the specified time period or the approval is withdrawn in accordance with paragraph (v)(3) of this section, the Administrator may allow the source or modification up to an additional 3 years to meet the requirement for the application of best available control technology through use of a demonstrated system of control.

(w) *Permit rescission.* (1) Any permit issued under this section or a prior version of this section shall remain in effect, unless and until it expires under paragraph (s) of this section or is rescinded.

(2) Any owner or operator of a stationary source or modification who holds a permit for the source or modification which was issued under 40 CFR 52.21 as in effect on July 30, 1987, or any earlier version of this section, may request that the Administrator rescind the permit or a particular portion of the permit.

(3) The Administrator shall grant an application for rescission if the application shows that this section would not apply to the source or modification.

(4) If the Administrator rescinds a permit under this paragraph, the public shall be given adequate notice of the rescission. Publication of an announcement of rescission in a newspaper of general circulation in the affected region within 60 days of the rescission shall be considered adequate notice.

[43 FR 26403, June 19, 1978]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 52.21, see the List of CFR

40 CRF SECCIÓN 60.7(a)(4)

DELEGATION STATUS OF NEW SOURCE PERFORMANCE STANDARDS—Continued
(NSPS) for Region VIII)

| Subpart | CO | MT ¹ | ND ¹ | SD ¹ | UT ¹ | WY |
|---|-----|-----------------|-----------------|-----------------|-----------------|-----|
| TTT—Plastic Parts for Business Machine Coatings | (*) | (*) | (*) | | (*) | (*) |
| UUU—Calciners and Dryers in Mineral Industries | (*) | (*) | (*) | | (*) | (*) |
| VVV—Polymeric Coating of Supporting Substrates | (*) | (*) | (*) | | (*) | (*) |
| WWW—Municipal Solid Waste Landfills | | | | | (*) | (*) |

(*) Indicates approval of state regulation.

(1) Indicates approval of New Source Performance Standards as part of the State Implementation Plan (SIP).

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 60.4 see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

[40 FR 18169, Apr. 25, 1975]

§ 60.5 Determination of construction or modification.

(a) When requested to do so by an owner or operator, the Administrator will make a determination of whether action taken or intended to be taken by such owner or operator constitutes construction (including reconstruction) or modification or the commencement thereof within the meaning of this part.

(b) The Administrator will respond to any request for a determination under paragraph (a) of this section within 30 days of receipt of such request.

[40 FR 58418, Dec. 16, 1975]

§ 60.6 Review of plans.

(a) When requested to do so by an owner or operator, the Administrator will review plans for construction or modification for the purpose of providing technical advice to the owner or operator.

(b)(1) A separate request shall be submitted for each construction or modification project.

(2) Each request shall identify the location of such project, and be accompanied by technical information describing the proposed nature, size, design, and method of operation of each affected facility involved in such project, including information on any equipment to be used for measurement or control of emissions.

(c) Neither a request for plans review nor advice furnished by the Administrator in response to such request shall (1) relieve an owner or operator of legal responsibility for compliance with any provision of this part or of any applicable State or local requirement, or (2)

prevent the Administrator from implementing or enforcing any provision of this part or taking any other action authorized by the Act.

[36 FR 24877, Dec. 23, 1971, as amended at 39 FR 9314, Mar. 8, 1974]

§ 60.7 Notification and record keeping.

(a) Any owner or operator subject to the provisions of this part shall furnish the Administrator written notification as follows:

(1) A notification of the date construction (or reconstruction as defined under § 60.15) of an affected facility is commenced postmarked no later than 30 days after such date. This requirement shall not apply in the case of mass-produced facilities which are purchased in completed form.

(2) A notification of the anticipated date of initial startup of an affected facility postmarked not more than 60 days nor less than 30 days prior to such date.

(3) A notification of the actual date of initial startup of an affected facility postmarked within 15 days after such date.

(4) A notification of any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless that change is specifically exempted under an applicable subpart or in § 60.14(e). This notice shall be postmarked 60 days or as soon as practicable before the change is commenced and shall include information describing the precise nature of the change, present and proposed emission control systems, productive capacity of the facility before and after the change, and the expected completion date of the change. The Administrator

may request additional relevant information subsequent to this notice.

(5) A notification of the date upon which demonstration of the continuous monitoring system performance commences in accordance with § 60.13(c). Notification shall be postmarked not less than 30 days prior to such date.

(6) A notification of the anticipated date for conducting the opacity observations required by § 60.11(e)(1) of this part. The notification shall also include, if appropriate, a request for the Administrator to provide a visible emissions reader during a performance test. The notification shall be postmarked not less than 30 days prior to such date.

(7) A notification that continuous opacity monitoring system data results will be used to determine compliance with the applicable opacity standard during a performance test required by § 60.8 in lieu of Method 9 observation data as allowed by § 60.11(e)(5) of this part. This notification shall be postmarked not less than 30 days prior to the date of the performance test.

(b) Any owner or operator subject to the provisions of this part shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of an affected facility; any malfunction of the air pollution control equipment; or any periods during which a continuous monitoring system or monitoring device is inoperative.

(c) Each owner or operator required to install a continuous monitoring system (CMS) or monitoring device shall submit an excess emissions and monitoring systems performance report (excess emissions are defined in applicable subparts) and/or a summary report form (see paragraph (d) of this section) to the Administrator semiannually, except when more frequent reporting is specifically required by an applicable subpart; or the CMS data are to be used directly for compliance determination, in which case quarterly reports shall be submitted; or the Administrator, on a case-by-case basis, determines that more frequent reporting is necessary to accurately assess the compliance status of the source. All reports shall be postmarked by the 30th day following the end of each calendar half (or quar-

ter, as appropriate). Written reports of excess emissions shall include the following information:

(1) The magnitude of excess emissions computed in accordance with § 60.13(h), any conversion factor(s) used, and the date and time of commencement and completion of each time period of excess emissions. The process operating time during the reporting period.

(2) Specific identification of each period of excess emissions that occurs during startups, shutdowns, and malfunctions of the affected facility. The nature and cause of any malfunction (if known), the corrective action taken or preventative measures adopted.

(3) The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks and the nature of the system repairs or adjustments.

(4) When no excess emissions have occurred or the continuous monitoring system(s) have not been inoperative, repaired, or adjusted, such information shall be stated in the report.

(d) The summary report form shall contain the information and be in the format shown in figure 1 unless otherwise specified by the Administrator. One summary report form shall be submitted for each pollutant monitored at each affected facility.

(1) If the total duration of excess emissions for the reporting period is less than 1 percent of the total operating time for the reporting period and CMS downtime for the reporting period is less than 5 percent of the total operating time for the reporting period, only the summary report form shall be submitted and the excess emission report described in § 60.7(c) need not be submitted unless requested by the Administrator.

(2) If the total duration of excess emissions for the reporting period is 1 percent or greater of the total operating time for the reporting period or the total CMS downtime for the reporting period is 5 percent or greater of the total operating time for the reporting period, the summary report form and the excess emission report described in § 60.7(c) shall both be submitted.

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based. In the absence of a notice of disapproval within 45 days, approval is automatically granted.

(3) As soon as monitoring data indicate that the affected facility is not in compliance with any emission limitation or operating parameter specified in the applicable standard, the frequency of reporting shall revert to the frequency specified in the applicable standard, and the owner or operator shall submit an excess emissions and monitoring systems performance report (and summary report, if required) at the next appropriate reporting period following the noncomplying event. After demonstrating compliance with the applicable standard for another full year, the owner or operator may again request approval from the Administrator to reduce the frequency of reporting for that standard as provided for in paragraphs (e)(1) and (e)(2) of this section.

(f) Any owner or operator subject to the provisions of this part shall maintain a file of all measurements, including continuous monitoring system, monitoring device, and performance testing measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and all other information required by this part recorded in a permanent form suitable for inspection. The file shall be retained for at least two years following the date of such measurements, maintenance, reports, and records.

(g) If notification substantially similar to that in paragraph (a) of this section is required by any other State or local agency, sending the Administrator a copy of that notification will satisfy the requirements of paragraph (a) of this section.

(h) Individual subparts of this part may include specific provisions which clarify or make inapplicable the provisions set forth in this section.

[36 FR 24877, Dec. 28, 1971, as amended at 40 FR 46254, Oct. 6, 1975; 40 FR 58418, Dec. 16, 1975; 45 FR 5617, Jan. 23, 1980; 48 FR 48335, Oct. 18, 1983; 50 FR 53113, Dec. 27, 1985; 52 FR 9781, Mar. 26, 1987; 55 FR 51382, Dec. 13, 1990; 59 FR 12428, Mar. 16, 1994; 59 FR 47265, Sep. 15, 1994]

§ 60.8 Performance tests.

(a) Within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility and at such other times as may be required by the Administrator under section 114 of the Act, the owner or operator of such facility shall conduct performance test(s) and furnish the Administrator a written report of the results of such performance test(s).

(b) Performance tests shall be conducted and data reduced in accordance with the test methods and procedures contained in each applicable subpart unless the Administrator (1) specifies or approves, in specific cases, the use of a reference method with minor changes in methodology, (2) approves the use of an equivalent method, (3) approves the use of an alternative method the results of which he has determined to be adequate for indicating whether a specific source is in compliance, (4) waives the requirement for performance tests because the owner or operator of a source has demonstrated by other means to the Administrator's satisfaction that the affected facility is in compliance with the standard, or (5) approves shorter sampling times and smaller sample volumes when necessitated by process variables or other factors. Nothing in this paragraph shall be construed to abrogate the Administrator's authority to require testing under section 114 of the Act.

(c) Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.

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(d) The owner or operator of an affected facility shall provide the Administrator at least 30 days prior notice of any performance test, except as specified under other subparts, to afford the Administrator the opportunity to have an observer present.

(e) The owner or operator of an affected facility shall provide, or cause to be provided, performance testing facilities as follows:

(1) Sampling ports adequate for test methods applicable to such facility. This includes (i) constructing the air pollution control system such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and procedures and (ii) providing a stack or duct free of cyclonic flow during performance tests, as demonstrated by applicable test methods and procedures.

(2) Safe sampling platform(s).

(3) Safe access to sampling platform(s).

(4) Utilities for sampling and testing equipment.

(f) Unless otherwise specified in the applicable subpart, each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. For the purpose of determining compliance with an applicable standard, the arithmetic means of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator's control, compliance may, upon the Administrator's approval, be determined using the arithmetic mean of the results of the two other runs.

[36 FR 24877, Dec. 23, 1971, as amended at 39 FR 9314, Mar. 8, 1974; 42 FR 57126, Nov. 1, 1977; 44 FR 33612, June 11, 1979; 54 FR 6662, Feb. 14, 1989; 54 FR 21344, May 17, 1989]

§ 60.9 Availability of information.

The availability to the public of information provided to, or otherwise obtained by, the Administrator under this part shall be governed by part 2 of

this chapter. (Information submitted voluntarily to the Administrator for the purposes of §§ 60.5 and 60.6 is governed by §§ 2.201 through 2.213 of this chapter and not by § 2.301 of this chapter.)

§ 60.10 State authority.

The provisions of this part shall not be construed in any manner to preclude any State or political subdivision thereof from:

(a) Adopting and enforcing any emission standard or limitation applicable to an affected facility, provided that such emission standard or limitation is not less stringent than the standard applicable to such facility.

(b) Requiring the owner or operator of an affected facility to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of such facility.

§ 60.11 Compliance with standards and maintenance requirements.

(a) Compliance with standards in this part, other than opacity standards, shall be determined in accordance with performance tests established by § 60.8, unless otherwise specified in the applicable standard.

(b) Compliance with opacity standards in this part shall be determined by conducting observations in accordance with Reference Method 9 in appendix A of this part, any alternative method that is approved by the Administrator, or as provided in paragraph (e)(5) of this section. For purposes of determining initial compliance, the minimum total time of observations shall be 3 hours (30 6-minute averages) for the performance test or other set of observations (meaning those fugitive-type emission sources subject only to an opacity standard).

(c) The opacity standards set forth in this part shall apply at all times except during periods of startup, shutdown, malfunction, and as otherwise provided in the applicable standard.

(d) At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in

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Edition, 1980, IBR approved February 25, 1985 for § 60.683(b).

(f) The following material is available for purchase from the following address: Underwriter's Laboratories, Inc. (UL), 333 Pfingsten Road, Northbrook, IL 60062.

(1) UL 103, Sixth Edition revised as of September 3, 1986, Standard for Chimneys, Factory-built, Residential Type and Building Heating Appliance.

(g) The following material is available for purchase from the following address: West Coast Lumber Inspection Bureau, 6980 SW. Barnes Road, Portland, OR 97223.

(1) West Coast Lumber Standard Grading Rules No. 16, pages 5-21 and 90 and 91, September 3, 1970, revised 1984.

(h) The following material is available for purchase from the American Society of Mechanical Engineers (ASME), 345 East 47th Street, New York, NY 10017.

(1) ASME QRO-1-1994, Standard for the Qualification and Certification of Resource Recovery Facility Operators, IBR approved for §§ 60.56a, 60.54b(a), and 60.54b(b).

(2) ASME PTC 4.1-1964 (Reaffirmed 1991), Power Test Codes: Test Code for Steam Generating Units (with 1968 and 1969 Addenda), IBR approved for §§ 60.46b, 60.58a(h)(6)(ii), and 60.58b(i)(6)(ii).

(3) ASME Interim Supplement 19.5 on Instruments and Apparatus: Application, Part II of Fluid Meters, 6th Edition (1971), IBR approved for §§ 60.58a(h)(6)(ii) and 60.58b(i)(6)(ii).

(i) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846 Third Edition (November 1986), as amended by Updates I (July, 1992), II (September 1994), IIA (August, 1993), and IIB (January, 1995). Test Method are incorporated by reference for appendix A to part 60, Method 29, pars. 2.2.1; 2.3.1; 2.5; 3.3.12.1; 3.3.12.2; 3.3.13; 3.3.14; 5.4.3; 6.2; 6.3; 7.2.1; 7.2.3; and Table 29-2. The Third Edition of SW-846 and Updates I, II, IIA, and IIB (document number 955-001-00000-1) are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, (202) 512-1800. Copies may be obtained from the Library of the U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

(j) Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985, Method 303F Determination of Mercury by the Cold Vapor Technique. This document may be obtained from the American Public Health Association, 1015 18th Street, NW., Washington, DC 20036, and is incorporated by reference for Method 29, pars 5.4.3; 6.3; and 7.2.3 of appendix A to part 60.

(k) This material is available for purchase from the American Hospital Association (AHA) Service, Inc., Post Office Box 92683, Chicago, Illinois 60675-2683. You may inspect a copy at EPA's Air and Radiation Docket and Information Center (Docket A-91-61, Item IV-J-124), Room M-1500, 401 M Street SW., Washington, DC.

(1) An Ounce of Prevention: Waste Reduction Strategies for Health Care Facilities. American Society for Health Care Environmental Services of the American Hospital Association, Chicago, Illinois, 1993. AHA Catalog No. 057007. ISBN 0-87258-673-5. IBR approved for § 60.35e and § 60.55c.

(1) This material is available for purchase from the National Technical Information Services, 5285 Port Royal Road, Springfield, Virginia 22161. You may inspect a copy at EPA's Air and Radiation Docket and Information Center (Docket A-91-61, Item IV-J-125), Room M-1500, 401 M Street SW., Washington, DC.

(1) OMB Bulletin No. 93-17: Revised Statistical Definitions for Metropolitan Areas. Office of Management and Budget, June 30, 1993. NTIS No. PB 93-192-664. IBR approved for § 60.31e.

148 FR 3735, Jan. 27, 1983)

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 60.17, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 60.18 General control device requirements.

(a) *Introduction.* This section contains requirements for control devices used to comply with applicable subparts of parts 60 and 61. The requirements are placed here for administrative convenience and only apply to facilities covered by subparts referring to this section.

(b) *Flares.* Paragraphs (c) through (f) apply to flares.

(c)(1) Flares shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (f), except for periods not to exceed

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a total of 5 minutes during any 2 consecutive hours.

(2) Flares shall be operated with a flame present at all times, as determined by the methods specified in paragraph (f).

(3) An owner/operator has the choice of adhering to either the heat content specifications in paragraph (c)(3)(ii) of this section and the maximum tip velocity specifications in paragraph (c)(4) of this section, or adhering to the requirements in paragraph (c)(3)(i) of this section.

(i)(A) Flares shall be used that have a diameter of 3 inches or greater, are non-assisted, have a hydrogen content of 8.0 percent (by volume), or greater, and are designed for and operated with an exit velocity less than 37.2 m/sec (122 ft/sec) and less than the velocity, V_{max} , as determined by the following equation:

$$V_{max} = (X_{H_2} - K_1) \cdot K_2$$

Where:

V_{max} = Maximum permitted velocity, m/sec.

K_1 = Constant, 6.0 volume-percent hydrogen.

K_2 = Constant, 3.9(m/sec)/volume-percent hydrogen.

X_{H_2} = The volume-percent of hydrogen, on a wet basis, as calculated by using the American Society for Testing and Materials (ASTM) Method D1946-77. (Incorporated by reference as specified in § 60.17).

(B) The actual exit velocity of a flare shall be determined by the method specified in paragraph (f)(4) of this section.

(ii) Flares shall be used only with the net heating value of the gas being combusted being 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted or air-assisted; or with the net heating value of the gas being combusted being 7.45 MJ/scm (200 Btu/scf) or greater if the flare is non-assisted. The net heating value of the gas being combusted shall be determined by the methods specified in paragraph (f)(3) of this section.

(4)(i) Steam-assisted and nonassisted flares shall be designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4) of this section, less than 18.3 m/sec (60 ft/sec), except as provided in paragraphs (c)(4) (ii) and (iii) of this section.

(ii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) are allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).

(iii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), less than the velocity, V_{max} , as determined by the method

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specified in paragraph (f)(5), and less than 122 m/sec (400 ft/sec) are allowed.

(5) Air-assisted flares shall be designed and operated with an exit velocity less than the velocity, V_{max} , as determined by the method specified in paragraph (f)(6).

(6) Flares used to comply with this section shall be steam-assisted, air-assisted, or nonassisted.

(d) Owners or operators of flares used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs. Applicable subparts will provide provisions stating how owners or operators of flares shall monitor these control devices.

(e) Flares used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

(f)(1) Reference Method 22 shall be used to determine the compliance of flares with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22.

(2) The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.

(3) The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$\begin{aligned} \text{GPH SPAN} &= '1' \text{ DEEP} = '31' \\ \text{PRT PAGE P} &= '55' \text{ GID EC01JN92.008} \\ & / \text{GPH} \end{aligned}$$

where:

H_T = Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20 °C;

$$\begin{aligned} \text{GPH SPAN} &= '2' \text{ DEEP} = '58' \\ \text{GID EC01JN92.009} \\ & / \text{GPH} \end{aligned}$$

C_i = Concentration of sample component i in ppm on a wet basis, as measured for organics by Reference Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946-77 (Incorporated by reference as specified in § 60.17); and

H_i = Net heat of combustion of sample component i, kcal/g mole at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D2382-76 (incorporated by reference as specified in § 60.17) if published values are not available or cannot be calculated.

(4) The actual exit velocity of a flare shall be determined by dividing the volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D as appropriate; by the unobstructed (free) cross sectional area of the flare tip.

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(5) The maximum permitted velocity, V_{max} , for flares complying with paragraph (c)(4)(iii) shall be determined by the following equation.

$$\text{Log}_{10}(V_{max}) = (H_T + 28.8) / 31.7$$

V_{max} = Maximum permitted velocity, M/sec
28.8 = Constant
31.7 = Constant
 H_T = The net heating value as determined in paragraph (f)(3).

(6) The maximum permitted velocity, V_{max} , for air-assisted flares shall be determined by the following equation.

$$V_{max} = 8.706 + 0.7084(H_T)$$

V_{max} = Maximum permitted velocity, m/sec
8.706 = Constant
0.7084 = Constant
 H_T = The net heating value as determined in paragraph (f)(3).

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[51 FR 2701, Jan. 21, 1986, as amended at 63 FR 24444, May 4, 1998]

§ 60.19 General notification and reporting requirements.

(a) For the purposes of this part, time periods specified in days shall be measured in calendar days, even if the word "calendar" is absent, unless otherwise specified in an applicable requirement.

(b) For the purposes of this part, if an explicit postmark deadline is not specified in an applicable requirement for the submittal of a notification, application, report, or other written communication to the Administrator, the owner or operator shall postmark the submittal on or before the number of days specified in the applicable requirement. For example, if a notification must be submitted 15 days before a particular event is scheduled to take place, the notification shall be postmarked on or before 15 days preceding the event; likewise, if a notification must be submitted 15 days after a particular event takes place, the notification shall be delivered or postmarked on or before 15 days following the end of the event. The use of reliable non-Government mail carriers that provide indications of verifiable delivery of information required to be submitted to the Administrator, similar to the postmark provided by the U.S. Postal Service, or alternative means of delivery agreed to by the permitting authority, is acceptable.

(c) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or operator, or the review of such information by the Administrator, such time periods or deadlines may be changed by mutual agreement between the owner or operator and the Administrator. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(d) If an owner or operator of an affected facility in a State with delegated authority is required to submit periodic reports under this part to the State, and if the State has an established timeline for the submission of periodic reports that is consistent with

the reporting frequency(ies) specified for such facility under this part, the owner or operator may change the dates by which periodic reports under this part shall be submitted (without changing the frequency of reporting) to be consistent with the State's schedule by mutual agreement between the owner or operator and the State. The allowance in the previous sentence applies in each State beginning 1 year after the affected facility is required to be in compliance with the applicable subpart in this part. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(e) If an owner or operator supervises one or more stationary sources affected by standards set under this part and standards set under part 61, part 63, or both such parts of this chapter, he/she may arrange by mutual agreement between the owner or operator and the Administrator (or the State with an approved permit program) a common schedule on which periodic reports required by each applicable standard shall be submitted throughout the year. The allowance in the previous sentence applies in each State beginning 1 year after the stationary source is required to be in compliance with the applicable subpart in this part, or 1 year after the stationary source is required to be in compliance with the applicable 40 CFR part 61 or part 63 of this chapter standard, whichever is latest. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(f)(1)(i) Until an adjustment of a time period or postmark deadline has been approved by the Administrator under paragraphs (f)(2) and (f)(3) of this section, the owner or operator of an affected facility remains strictly subject to the requirements of this part.

(ii) An owner or operator shall request the adjustment provided for in paragraphs (f)(2) and (f)(3) of this section each time he or she wishes to change an applicable time period or postmark deadline specified in this part.

(2) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or

(3) Gas monitoring results from monitoring and any remediation plans required by § 258.23 of this part;

(4) Any MSWLF unit design documentation for placement of leachate or gas condensate in a MSWLF unit as required under § 258.28(a)(2) of this part;

(5) Any demonstration, certification, finding, monitoring, testing, or analytical data required by subpart E of this part;

(6) Closure and post-closure care plans and any monitoring, testing, or analytical data as required by §§ 258.60 and 258.61 of this part; and

(7) Any cost estimates and financial assurance documentation required by subpart G of this part.

(8) Any information demonstrating compliance with small community exemption as required by § 258.1(f)(2).

(b) The owner/operator must notify the State Director when the documents from paragraph (a) of this section have been placed or added to the operating record, and all information contained in the operating record must be furnished upon request to the State Director or be made available at all reasonable times for inspection by the State Director.

(c) The Director of an approved State can set alternative schedules for recordkeeping and notification requirements as specified in paragraphs (a) and (b) of this section, except for the notification requirements in § 258.10(b) and § 258.55(g)(1)(iii).

§§ 258.30-258.39 [Reserved]

Subpart D—Design Criteria

§ 258.40 Design criteria.

(a) New MSWLF units and lateral expansions shall be constructed:

(1) In accordance with a design approved by the Director of an approved State or as specified in § 258.40(e) for unapproved States. The design must ensure that the concentration values listed in Table 1 of this section will not be exceeded in the uppermost aquifer at the relevant point of compliance, as specified by the Director of an approved State under paragraph (d) of this section, or

(2) With a composite liner, as defined in paragraph (b) of this section and a

leachate collection system that is designed and constructed to maintain less than a 30-cm depth of leachate over the liner.

(b) For purposes of this section, *composite liner* means a system consisting of two components; the upper component must consist of a minimum 30-mil flexible membrane liner (FML), and the lower component must consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. FML components consisting of high density polyethylene (HDPE) shall be at least 60-mil thick. The FML component must be installed in direct and uniform contact with the compacted soil component.

(c) When approving a design that complies with paragraph (a)(1) of this section, the Director of an approved State shall consider at least the following factors:

(1) The hydrogeologic characteristics of the facility and surrounding land;

(2) The climatic factors of the area; and

(3) The volume and physical and chemical characteristics of the leachate.

(d) The relevant point of compliance specified by the Director of an approved State shall be no more than 150 meters from the waste management unit boundary and shall be located on land owned by the owner of the MSWLF unit. In determining the relevant point of compliance State Director shall consider at least the following factors:

(1) The hydrogeologic characteristics of the facility and surrounding land;

(2) The volume and physical and chemical characteristics of the leachate;

(3) The quantity, quality, and direction, of flow of ground water;

(4) The proximity and withdrawal rate of the ground-water users;

(5) The availability of alternative drinking water supplies;

(6) The existing quality of the ground water, including other sources of contamination and their cumulative impacts on the ground water, and whether the ground water is currently used or reasonably expected to be used for drinking water;

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(7) Public health, safety, and welfare effects; and

(8) Practicable capability of the owner or operator.

(e) If EPA does not promulgate a rule establishing the procedures and requirements for State compliance with RCRA section 4005(c)(1)(B) by October 9, 1993, owners and operators in unapproved States may utilize a design meeting the performance standard in §258.40(a)(1) if the following conditions are met:

(1) The State determines the design meets the performance standard in §258.40(a)(1);

(2) The State petitions EPA to review its determination; and

(3) EPA approves the State determination or does not disapprove the determination within 30 days.

NOTE TO SUBPART D: 40 CFR part 239 is reserved to establish the procedures and requirements for State compliance with RCRA section 4005(c)(1)(B).

TABLE 1

| Chemical | MCL (mg/l) |
|------------------------------------|------------|
| Arsenic | 0.05 |
| Barium | 1.0 |
| Benzene | 0.005 |
| Cadmium | 0.01 |
| Carbon tetrachloride | 0.005 |
| Chromium (hexavalent) | 0.05 |
| 2,4-Dichlorophenoxy acetic acid | 0.1 |
| 1,4-Dichlorobenzene | 0.075 |
| 1,2-Dichloroethane | 0.005 |
| 1,1-Dichloroethylene | 0.007 |
| Endrin | 0.0002 |
| Fluoride | 4 |
| Lindane | 0.004 |
| Lead | 0.05 |
| Mercury | 0.002 |
| Methoxychlor | 0.1 |
| Nitrate | 10 |
| Selenium | 0.01 |
| Silver | 0.05 |
| Toxaphene | 0.005 |
| 1,1,1-Trichloroethane | 0.2 |
| Trichloroethylene | 0.005 |
| 2,4,5-Trichlorophenoxy acetic acid | 0.01 |
| Vinyl Chloride | 0.002 |

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Subpart E—Ground-Water Monitoring and Corrective Action

§ 258.50 Applicability.

(a) The requirements in this part apply to MSWLF units, except as provided in paragraph (b) of this section.

(b) Ground-water monitoring requirements under §258.51 through §258.55 of this part may be suspended by the Director of an approved State for a MSWLF unit if the owner or operator can demonstrate that there is no potential for migration of hazardous constituents from that MSWLF unit to the uppermost aquifer (as defined in §258.2) during the active life of the unit and the post-closure care period. This demonstration must be certified by a qualified ground-water scientist and approved by the Director of an approved State, and must be based upon:

(1) Site-specific field collected measurements, sampling, and analysis of physical, chemical, and biological processes affecting contaminant fate and transport, and

(2) Contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and environment.

(c) Owners and operators of MSWLF units, except those meeting the conditions of §258.1(f), must comply with the ground-water monitoring requirements of this part according to the following schedule unless an alternative schedule is specified under paragraph (d) of this section:

(1) Existing MSWLF units and lateral expansions less than one mile from a drinking water intake (surface or subsurface) must be in compliance with the ground-water monitoring requirements specified in §§ 258.51-258.55 by October 9, 1994;

(2) Existing MSWLF units and lateral expansions greater than one mile but less than two miles from a drinking water intake (surface or subsurface) must be in compliance with the ground-water monitoring requirements specified in §§ 258.51-258.55 by October 9, 1995;

(3) Existing MSWLF units and lateral expansions greater than two miles from a drinking water intake (surface or subsurface) must be in compliance with the ground-water monitoring requirements specified in §§ 258.51-258.55 by October 9, 1996.

(4) New MSWLF units must be in compliance with the ground-water monitoring requirements specified in §§ 258.51-258.55 before waste can be placed in the unit.

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(ii) Consistent with the overall objective of the remedy.

(4) Notify the State Director within 14 days that a report justifying the alternative measures prior to implementing the alternative measures has been placed in the operating record.

(d) All solid wastes that are managed pursuant to a remedy required under § 258.57, or an interim measure required under § 258.58(a)(3), shall be managed in a manner:

(1) That is protective of human health and the environment; and

(2) That complies with applicable RCRA requirements.

(e) Remedies selected pursuant to § 258.57 shall be considered complete when:

(1) The owner or operator complies with the ground-water protection standards established under §§ 258.55(h) or (i) at all points within the plume of contamination that lie beyond the ground-water monitoring well system established under § 258.51(a).

(2) Compliance with the ground-water protection standards established under §§ 258.55(h) or (i) has been achieved by demonstrating that concentrations of appendix II constituents have not exceeded the ground-water protection standard(s) for a period of three consecutive years using the statistical procedures and performance standards in § 258.53(g) and (h). The Director of an approved State may specify an alternative length of time during which the owner or operator must demonstrate that concentrations of appendix II constituents have not exceeded the ground-water protection standard(s) taking into consideration:

(i) Extent and concentration of the release(s);

(ii) Behavior characteristics of the hazardous constituents in the ground-water;

(iii) Accuracy of monitoring or modeling techniques, including any seasonal, meteorological, or other environmental variabilities that may affect the accuracy; and

(iv) Characteristics of the ground-water.

(3) All actions required to complete the remedy have been satisfied.

(f) Upon completion of the remedy, the owner or operator must notify the

State Director within 14 days that a certification that the remedy has been completed in compliance with the requirements of § 258.58(e) has been placed in the operating record. The certification must be signed by the owner or operator and by a qualified ground-water scientist or approved by the Director of an approved State.

(g) When, upon completion of the certification, the owner or operator determines that the corrective action remedy has been completed in accordance with the requirements under paragraph (e) of this section, the owner or operator shall be released from the requirements for financial assurance for corrective action under § 258.73.

§ 258.59 [Reserved]

Subpart F—Closure and Post-Closure Care

§ 258.60 Closure criteria.

(a) Owners or operators of all MSWLF units must install a final cover system that is designed to minimize infiltration and erosion. The final cover system must be designed and constructed to:

(1) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less, and

(2) Minimize infiltration through the closed MSWLF by the use of an infiltration layer that contains a minimum 18-inches of earthen material, and

(3) Minimize erosion of the final cover by the use of an erosion layer that contains a minimum 6-inches of earthen material that is capable of sustaining native plant growth.

(b) The Director of an approved State may approve an alternative final cover design that includes:

(1) An infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (a)(1) and (a)(2) of this section, and

(2) An erosion layer that provides equivalent protection from wind and water erosion as the erosion layer specified in paragraph (a)(3) of this section.

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(3) The Director of an approved State may establish alternative requirements for the infiltration barrier in a paragraph (b)(1) of this section, after public review and comment, for any owners or operators of MSWLFs that dispose of 20 tons of municipal solid waste per day or less, based on an annual average. Any alternative requirements established under this paragraph must:

(i) Consider the unique characteristics of small communities;

(ii) Take into account climatic and hydrogeologic conditions; and

(iii) Be protective of human health and the environment.

(c) The owner or operator must prepare a written closure plan that describes the steps necessary to close all MSWLF units at any point during their active life in accordance with the cover design requirements in § 258.60(a) or (b), as applicable. The closure plan, at a minimum, must include the following information:

(1) A description of the final cover, designed in accordance with § 258.60(a) and the methods and procedures to be used to install the cover;

(2) An estimate of the largest area of the MSWLF unit ever requiring a final cover as required under § 258.60(a) at any time during the active life;

(3) An estimate of the maximum inventory of wastes ever on-site over the active life of the landfill facility; and

(4) A schedule for completing all activities necessary to satisfy the closure criteria in § 258.60.

(d) The owner or operator must notify the State Director that a closure plan has been prepared and placed in the operating record no later than the effective date of this part, or by the initial receipt of waste, whichever is later.

(e) Prior to beginning closure of each MSWLF unit as specified in § 258.60(f), an owner or operator must notify the State Director that a notice of the intent to close the unit has been placed in the operating record.

(f) The owner or operator must begin closure activities of each MSWLF unit no later than 30 days after the date on which the MSWLF unit receives the known final receipt of wastes or, if the MSWLF unit has remaining capacity

and there is a reasonable likelihood that the MSWLF unit will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be granted by the Director of an approved State if the owner or operator demonstrates that the MSWLF unit has the capacity to receive additional wastes and the owner or operator has taken and will continue to take all steps necessary to prevent threats to human health and the environmental from the unclosed MSWLF unit.

(g) The owner or operator of all MSWLF units must complete closure activities of each MSWLF unit in accordance with the closure plan within 180 days following the beginning of closure as specified in paragraph (f) of this section. Extensions of the closure period may be granted by the Director of an approved State if the owner or operator demonstrates that closure will, of necessity, take longer than 180 days and he has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed MSWLF unit.

(h) Following closure of each MSWLF unit, the owner or operator must notify the State Director that a certification, signed by an independent registered professional engineer or approved by Director of an approved State, verifying that closure has been completed in accordance with the closure plan, has been placed in the operating record.

(i)(1) Following closure of all MSWLF units, the owner or operator must record a notation on the deed to the landfill facility property, or some other instrument that is normally examined during title search, and notify the State Director that the notation has been recorded and a copy has been placed in the operating record.

(2) The notation on the deed must in perpetuity notify any potential purchaser of the property that:

(i) The land has been used as a landfill facility; and

(ii) Its use is restricted under § 258.61(c)(3).

(j) The owner or operator may request permission from the Director of

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an approved State to remove the notation from the deed if all wastes are removed from the facility.

[56 FR 51018, Oct. 9, 1991; 57 FR 28628, June 26, 1992, as amended at 62 FR 40713, July 29, 1997]

§ 258.61 Post-closure care requirements.

(a) Following closure of each MSWLF unit, the owner or operator must conduct post-closure care. Post-closure care must be conducted for 30 years, except as provided under paragraph (b) of this section, and consist of at least the following:

(1) Maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(2) Maintaining and operating the leachate collection system in accordance with the requirements in § 258.40, if applicable. The Director of an approved State may allow the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment;

(3) Monitoring the ground water in accordance with the requirements of subpart E of this part and maintaining the ground-water monitoring system, if applicable; and

(4) Maintaining and operating the gas monitoring system in accordance with the requirements of § 258.23.

(b) The length of the post-closure care period may be:

(1) Decreased by the Director of an approved State if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment and this demonstration is approved by the Director of an approved State; or

(2) Increased by the Director of an approved State if the Director of an approved State determines that the lengthened period is necessary to protect human health and the environment.

(c) The owner or operator of all MSWLF units must prepare a written

post-closure plan that includes, at a minimum, the following information:

(1) A description of the monitoring and maintenance activities required in § 258.61(a) for each MSWLF unit, and the frequency at which these activities will be performed;

(2) Name, address, and telephone number of the person or office to contact about the facility during the post-closure period; and

(3) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this part 258. The Director of an approved State may approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.

(d) The owner or operator must notify the State Director that a post-closure plan has been prepared and placed in the operating record no later than the effective date of this part, October 9, 1993, or by the initial receipt of waste, whichever is later.

(e) Following completion of the post-closure care period for each MSWLF unit, the owner or operator must notify the State Director that a certification, signed by an independent registered professional engineer or approved by the Director of an approved State, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

[56 FR 51018, Oct. 9, 1991; 57 FR 28628, June 26, 1992]

§§ 258.62-258.69 [Reserved]

Subpart G—Financial Assurance Criteria

SOURCE: 56 FR 51029, Oct. 9, 1991, unless otherwise noted.

APÉNDICE A MÉTODO 2E DEL 40 CRF PARTE 60

METHOD 2E - DETERMINATION OF LANDFILL GAS
PRODUCTION FLOW RATE

1. Applicability and Principle

1.1 Applicability. This method applies to the measurement of landfill gas (LFG) production flow rate from municipal solid waste (MSW) landfills and is used to calculate the flow rate of nonmethane organic compounds (NMOC) from landfills. This method also applies to calculating a site-specific k value as provided in § 60.754(a)(4). It is unlikely that a site-specific k value obtained through Method 2E testing will lower the annual emission estimate below 50 Mg/yr NMOC unless the Tier 2 emission estimate is only slightly higher than 50 Mg/yr NMOC. Dry, arid regions may show a more significant difference between the default and calculated k values than wet regions.

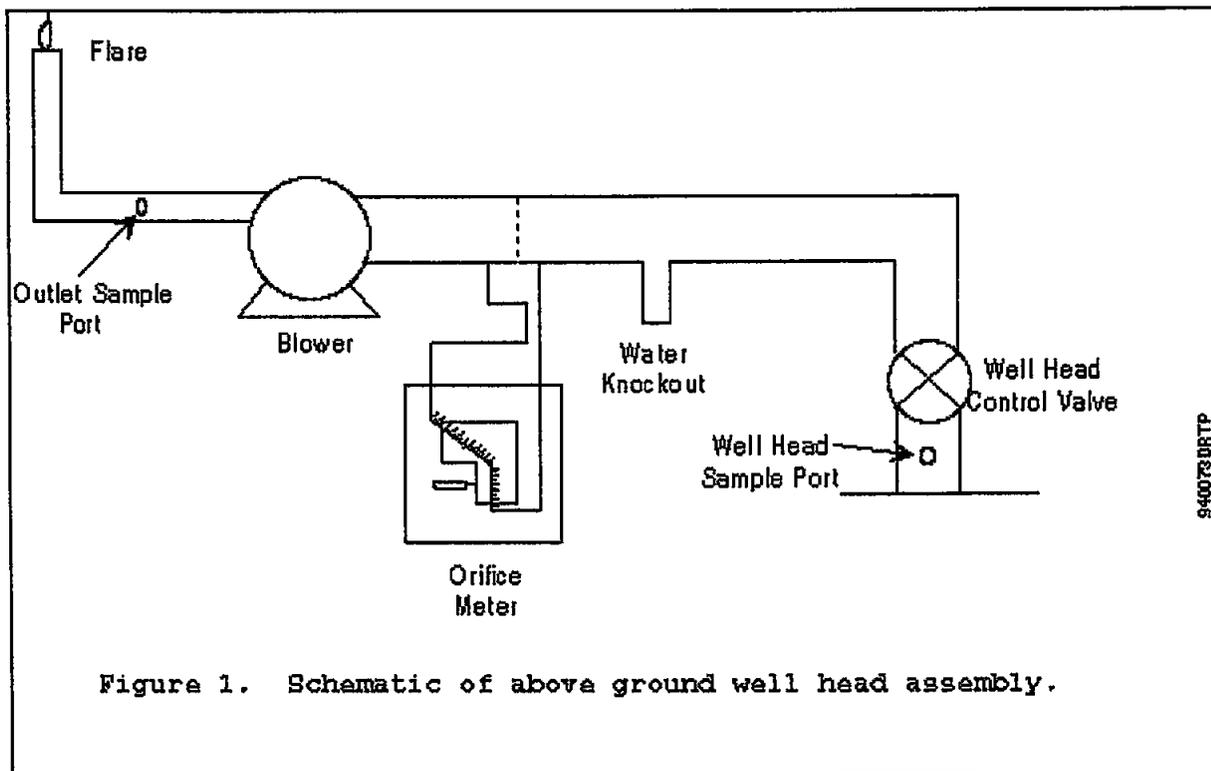
1.2 Principle. Extraction wells are installed either in a cluster of three or at five locations dispersed throughout the landfill. A blower is used to extract LFG from the landfill. LFG composition, landfill pressures near the extraction well, and volumetric flow rate of LFG extracted from the wells are measured and the landfill gas production flow rate is calculated.

2. Apparatus

2.1 Well Drilling Rig. Capable of boring a 0.6 meters diameter hole into the landfill to a minimum of 75 percent of the landfill depth. The depth of the well shall not exceed the bottom of the landfill or the liquid level.

2.2 Gravel. No fines. Gravel diameter should be appreciably larger than perforations stated in sections 2.10 and 3.2 of this method.

2.3 Bentonite.



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2.4 Backfill Material. Clay, soil, and sandy loam have been found to be acceptable.

2.5 Extraction Well Pipe. Polyvinyl chloride (PVC), high density polyethylene (HDPE), fiberglass, stainless steel, or other suitable nonporous material capable of transporting landfill gas with a minimum diameter of 0.075 meters and suitable wall-thickness.

2.6 Wellhead Assembly. Valve capable of adjusting gas flow at the wellhead and outlet, and a flow measuring device, such as an in-line orifice meter or pitot tube. A schematic of the wellhead assembly is shown in figure 1.

2.7 Cap. PVC, HDPE, fiberglass, stainless steel, or other suitable nonporous material capable of transporting landfill gas with a suitable wall-thickness.

2.8 Header Piping. PVC, HDPE, fiberglass, stainless steel, or other suitable nonporous material capable of transporting landfill gas with a suitable wall-thickness.

2.9 Auger. Capable of boring a 0.15 to 0.23 meters diameter hole to a depth equal to the top of the perforated section of the extraction well, for pressure probe installation.

2.10 Pressure Probe. PVC or stainless steel (316), 0.025 meters. Schedule 40 pipe. Perforate the bottom two thirds. A minimum requirement for perforations is slots or holes with an open area equivalent to four 6.0 millimeter diameter holes spaced 90° apart every 0.15 meters.

2.11 Blower and Flare Assembly. A water knockout, flare or incinerator, and an explosion-proof blower, capable of extracting LFG at a flow rate of at least 8.5 cubic meters per minute.

2.12 Standard Pitot Tube and Differential Pressure Gauge for Flow Rate Calibration with Standard Pitot. Same as Method 2, sections 2.1 and 2.8.

2.13 Gas flow measuring device. Permanently mounted Type S pitot tube or an orifice meter.

2.14 Barometer. Same as Method 4, section 2.1.5.

2.15 Differential Pressure Gauge. Water-filled U-tube manometer or equivalent, capable of measuring within 0.02 mm Hg, for measuring the pressure of the pressure probes.

3. Procedure

3.1 Placement of Extraction Wells. The landfill owner or operator shall either install

a single cluster of three extraction wells in a test area or space five wells over the landfill. The cluster wells are recommended but may be used only if the composition, age of the solid waste, and the landfill depth of the test area can be determined. CAUTION: Since this method is complex, only experienced personnel should conduct the test. Landfill gas contains methane, therefore explosive mixtures may exist at or near the landfill. It is advisable to take appropriate safety precautions when testing landfills, such as installing explosion-proof equipment and refraining from smoking.

3.1.1 Cluster Wells. Consult landfill site records for the age of the solid waste, depth, and composition of various sections of the landfill. Select an area near the perimeter of the landfill with a depth equal to or greater than the average depth of the landfill and with the average age of the solid waste between 2 and 10 years old. Avoid areas known to contain nondecomposable materials, such as concrete and asbestos. Locate wells as shown in figure 2.

Because the age of the solid waste in a test area will not be uniform, calculate a weighted average to determine the average age of the solid waste as follows.

$$A_{avg} = \sum_{i=1}^n f_i A_i$$

where,

A_{avg} = average age of the solid waste tested, year

f_i = fraction of the solid waste in the i^{th} section

A_i = age of the i^{th} fraction, year

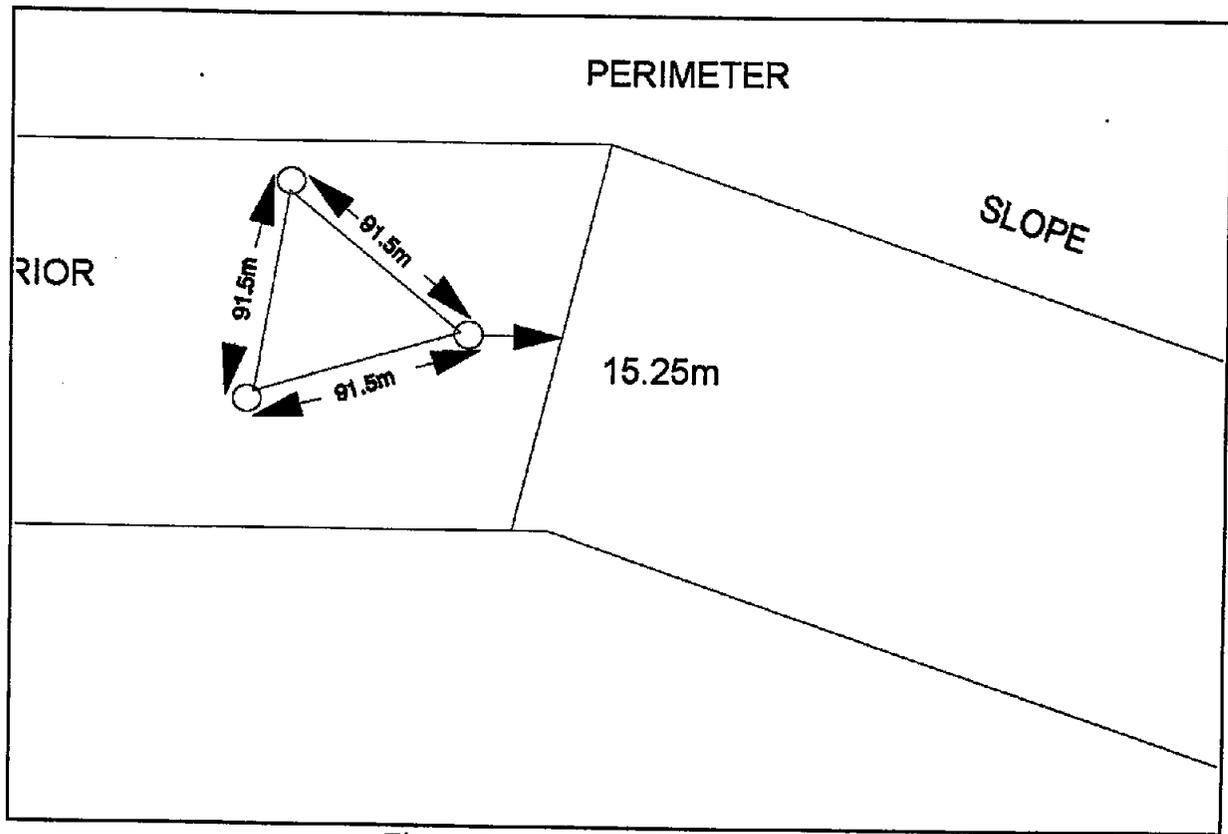
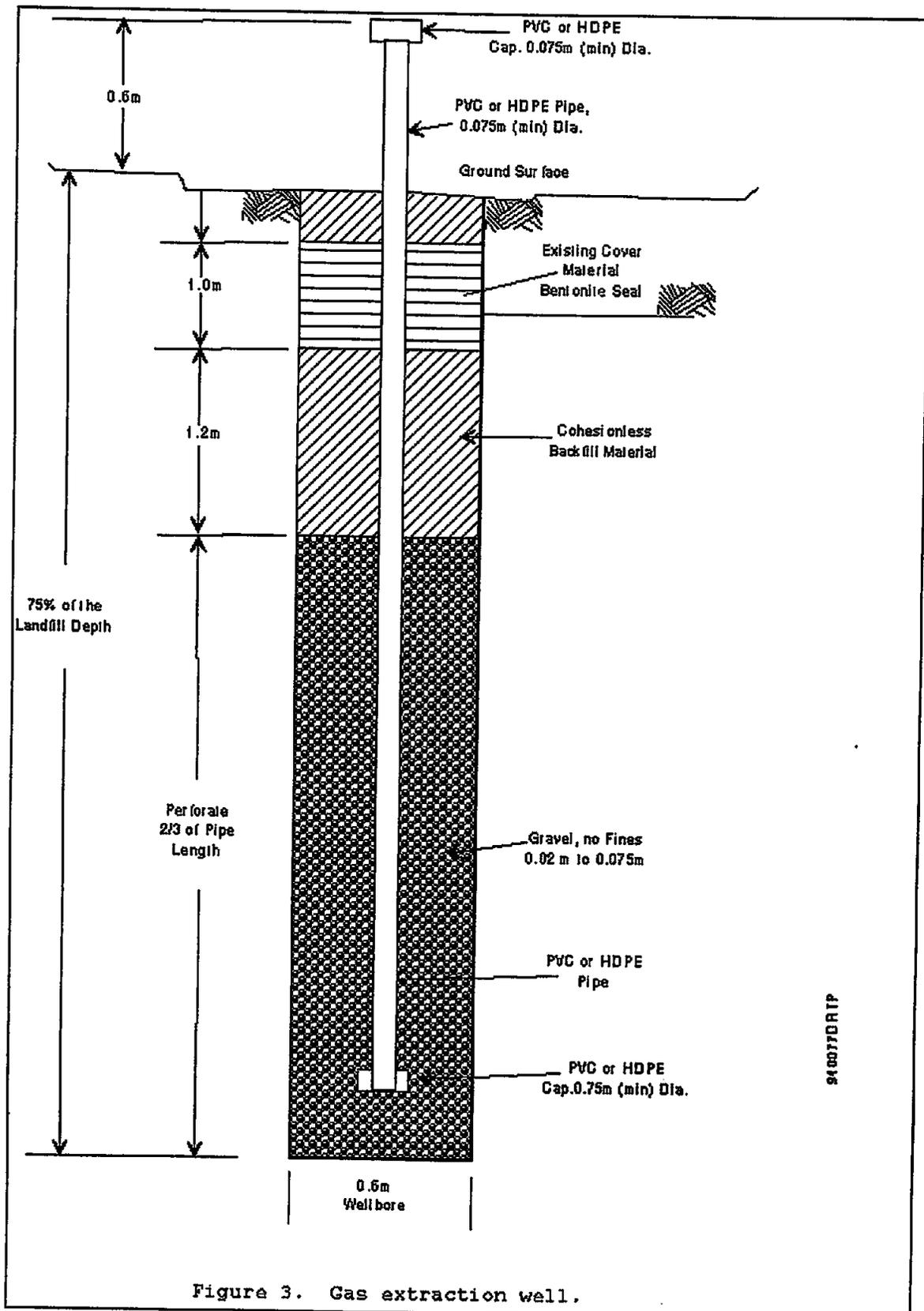


Figure 2. Location of Cluster Wells

3.1.2 Equal Volume Wells. This procedure is used when the composition, age of solid waste, and landfill depth are not well known. Divide the portion of the landfill that has had waste for at least 2 years into five areas representing equal volumes. Locate an extraction well near the center of each area. Avoid areas known to contain nondecomposable materials, such as concrete and asbestos.

3.2 Installation of Extraction Wells. Use a well drilling rig to dig a 0.6 meters diameter hole in the landfill to a minimum of 75 percent of the landfill depth, not to exceed the bottom of the landfill or the water table. Perforate the bottom two thirds of the extraction well pipe. Perforations shall not be closer than 6 meters from the cover. Perforations shall be holes or slots with an open area equivalent to 1.0 centimeter diameter holes spaced 90 degrees apart every 0.1 to 0.2 meters. Place the extraction well in the center of the hole and backfill with 2.0 to 7.5 centimeters gravel to a level 0.3 meters above the perforated section. Add a layer of backfill material 1.2 meters thick. Add a layer of bentonite 1.0 meter thick, and backfill the remainder of the hole with cover material or material equal in permeability to the existing cover material. The specifications for extraction well installation are shown in figure 3.



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Figure 3. Gas extraction well.

3.3 Pressure Probes. Shallow pressure probes are used in the check for infiltration of air into the landfill, and deep pressure probes are used to determine the radius of influence. Locate the deep pressure probes along three radial arms approximately 120 degrees apart at distances of 3, 15, 30, and 45 meters from the extraction well. The tester has the option of locating additional pressure probes at distances every 15 meters beyond 45 meters. Example placements of probes are shown in figure 4.

The probes located 15, 30, and 45 meters from each well, and any additional probes located along the three radial arms (deep probes), shall extend to a depth equal to the top of the perforated section of the extraction wells. Locate three shallow probes at a distance of 3 m from

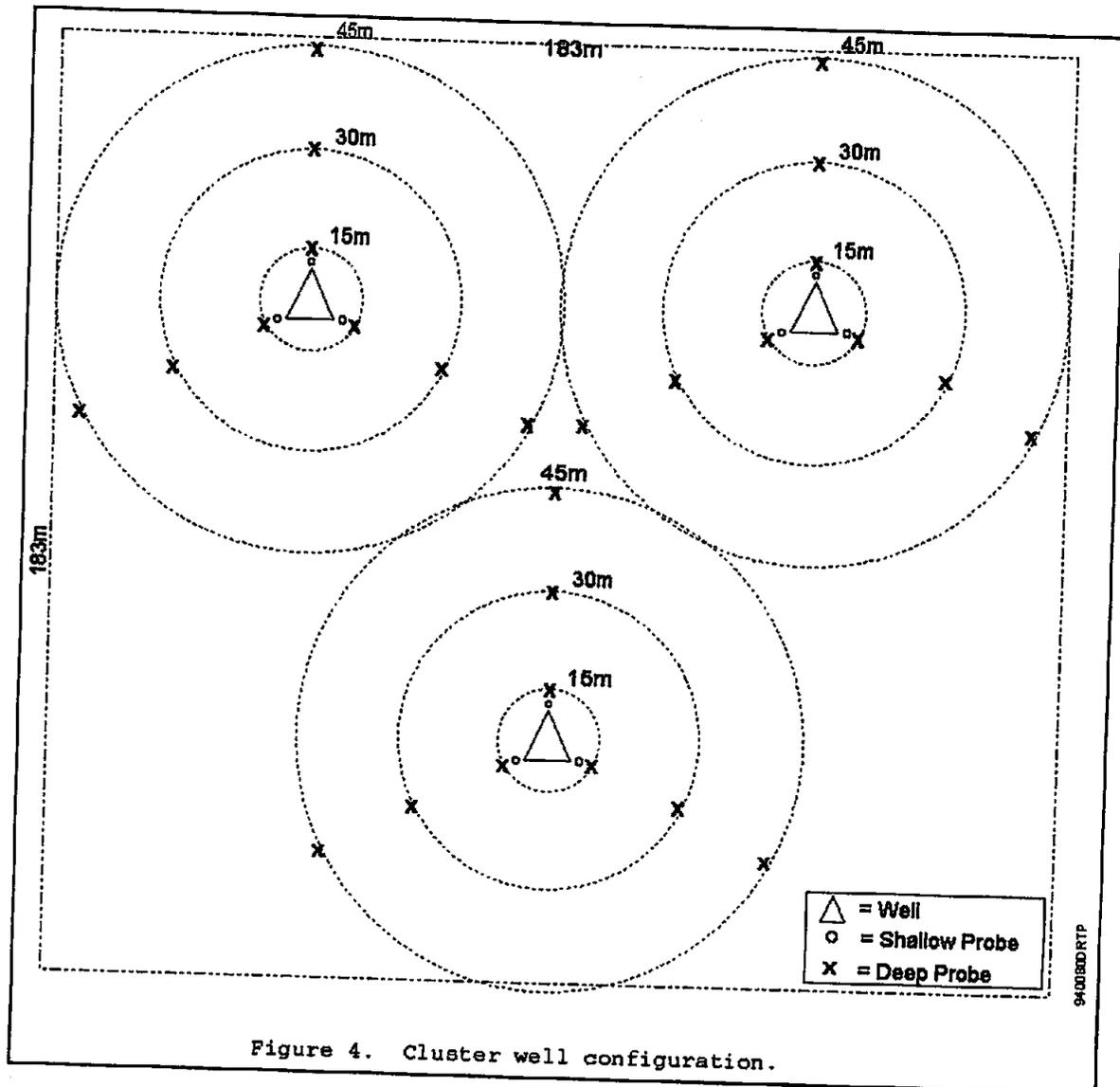


Figure 4. Cluster well configuration.

the extraction well. Shallow probes shall extend to a depth equal to half the depth of the deep probes.

Use an auger to dig a hole, approximately 0.15 to 0.23 meters in diameter, for each pressure probe. Perforate the bottom two thirds of the pressure probe. Perforations shall be holes or slots with an open area equivalent to four 6.0 millimeter diameter holes spaced 90 degrees apart every 0.15 meters. Place the pressure probe in the center of the hole and backfill with gravel to a level 0.30 meters above the perforated section. Add a layer of backfill material at least 1.2 meters thick. Add a layer of bentonite at least 0.3 meters thick, and backfill the remainder of the hole with cover material or material equal in permeability to the existing cover material. The specifications for pressure probe installation are shown in figure 5.

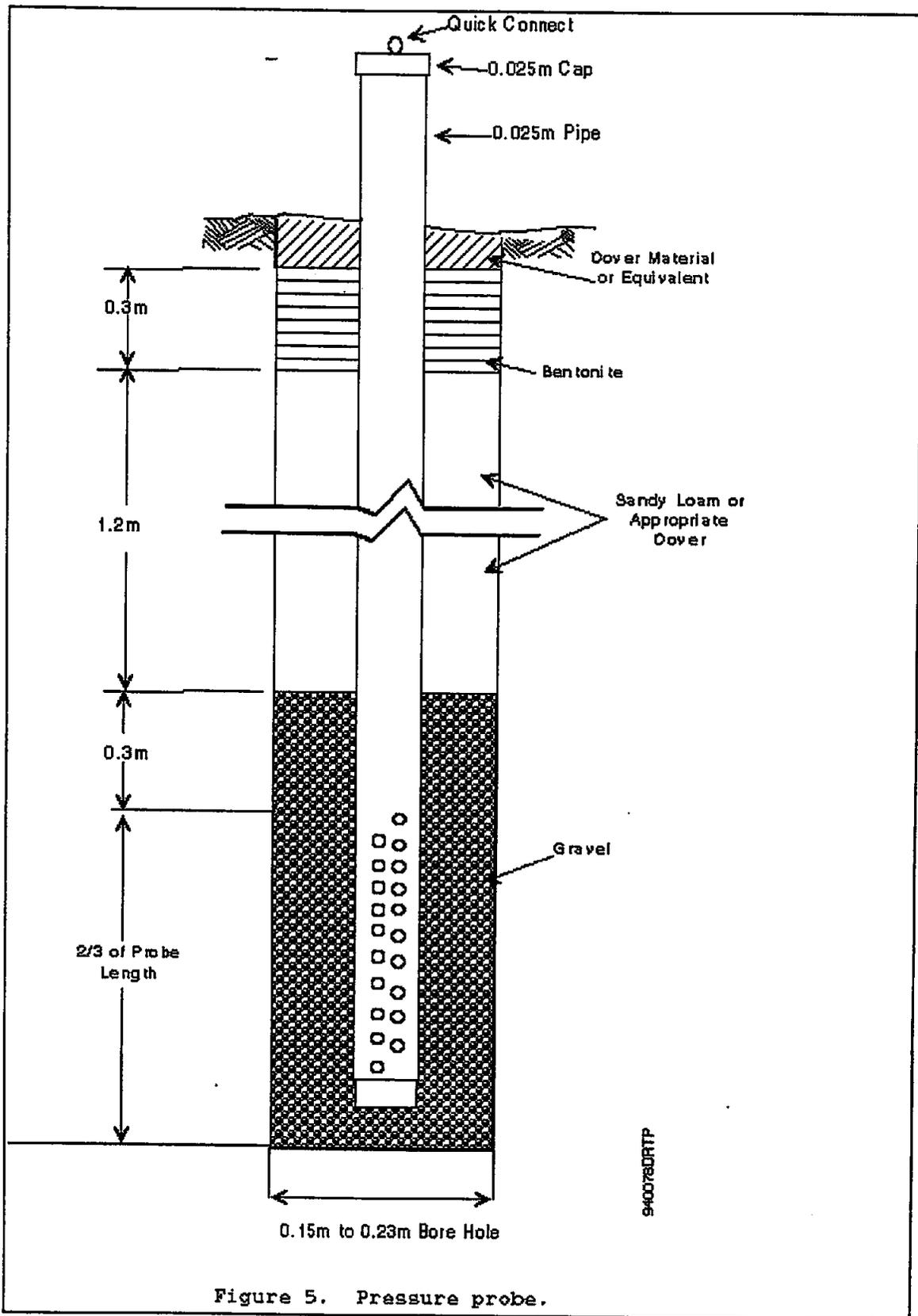


Figure 5. Pressure probe.

3.4 LFG Flow Rate Measurement. Determine the flow rate of LFG from the test wells continuously during testing with an orifice meter. Alternative methods to measure the LFG flow rate may be used with approval of the Administrator. Locate the orifice meter as shown in figure 1. Attach the wells to the blower and flare assembly. The individual wells may be ducted to a common header so that a single blower and flare assembly and flow meter may be used. Use the procedures in section 4.1 to calibrate the flow meter.

3.5 Leak Check. A leak check of the above ground system is required for accurate flow rate measurements and for safety. Sample LFG at the wellhead sample port and at a point downstream of the flow measuring device. Use Method 3C to determine nitrogen (N₂) concentrations. Determine the difference by using the formula below.

$$\text{Difference} = C_o - C_w$$

where,

C_o = concentration of N₂ at the outlet, ppmv

C_w = concentration of N₂ at the wellhead, ppmv

The system passes the leak check if the difference is less than 10,000 ppmv. If the system fails the leak check, make the appropriate adjustments to the above ground system and repeat the leak check.

3.6 Static Testing. The purpose of the static testing is to determine the initial conditions of the landfill. Close the control valves on the wells so that there is no flow of landfill gas from the well. Measure the gauge pressure (P_g) at each deep pressure probe and the barometric

pressure (P_{bar}) every 8 hours for 3 days. Convert the gauge pressure of each deep pressure probe to absolute pressure by using the following equation. Record as P_i .

$$P_i = P_{\text{bar}} + P_g$$

where,

P_{bar} = Atmospheric pressure, mm Hg

P_g = Gauge pressure of the deep probes, mm Hg

P_i = Initial absolute pressure of the deep probes during static testing, mm Hg

3.6.1 For each probe, average all of the 8 hr deep pressure probe readings and record as P_{ia} . The P_{ia} is used in section 3.7.6 to determine the maximum radius of influence.

3.6.2 Measure the LFG temperature and the static flow rate of each well once during static testing using a flow measurement device, such as a Type S pitot tube and measure the temperature of the landfill gas. The flow measurements should be made either just before or just after the measurements of the probe pressures and are used in determining the initial flow from the extraction well during the short term testing. The temperature measurement is used in the check for infiltration.

3.7 Short Term Testing. The purpose of short term testing is to determine the maximum vacuum that can be applied to the wells without infiltration of air into the landfill. The short term testing is done on one well at a time. During the short term testing, burn LFG with a flare or incinerator.

3.7.1 Use the blower to extract LFG from a single well at a rate at least twice the static

flow rate of the respective well measured in section 3.6.2. If using a single blower and flare assembly and a common header system, close the control valve on the wells not being measured. Allow 24 hours for the system to stabilize at this flow rate.

3.7.2 Check for infiltration of air into the landfill by measuring the temperature of the LFG at the wellhead, the gauge pressures of the shallow pressure probes, and the LFG N₂ concentration by using Method 3C. CAUTION: Increased vacuum at the wellhead may cause infiltration of air into the landfill, which increases the possibility of a landfill fire. Infiltration of air into the landfill may occur if any of the following conditions are met: the LFG N₂ concentration is more than 20 percent, any of the shallow probes have a negative gauge pressure, or the temperature has increased above 55 °C or the maximum established temperature during static testing. If infiltration has not occurred, increase the blower vacuum by 4 mm Hg, wait 24 hours, and repeat the infiltration check. If at any time, the temperature change exceeds the limit, stop the test until it is safe to proceed. Continue the above steps of increasing blower vacuum by 4 mm Hg, waiting 24 hours, and checking for infiltration until the concentration of N₂ exceeds 20 percent or any of the shallow probes have a negative gauge pressure, at which time reduce the vacuum at the wellhead so that the N₂ concentration is less than 20 percent and the gauge pressures of the shallow probes are positive. This is the maximum vacuum at which infiltration does not occur.

3.7.3 At this maximum vacuum, measure P_{bar} every 8 hours for 24 hours and record the LFG flow rate as Q_s and the probe gauge pressures for all of the probes as P_f . Convert the gauge pressures of the deep probes to absolute pressures for each 8-hour reading at Q_s as follows:

$$P = P_{\text{bar}} + P_f$$

where,

P_{bar} = Atmospheric pressure, mm Hg

P_f = Final absolute pressure of the deep probes during short term testing,
mm Hg

P = Pressure of the deep probes, mm Hg

3.7.4 For each probe, average the 8-hr deep pressure probe readings and record as P_{fa} .

3.7.5 For each probe, compare the initial average pressure (P_{ia}) from section 3.6.1 to the final average pressure (P_{fa}). Determine the furthestmost point from the wellhead along each radial arm where $P_{fa} \leq P_{ia}$. This distance is the maximum radius of influence (ROI), which is the distance from the well affected by the vacuum. Average these values to determine the average maximum radius of influence (R_{ma}).

The average R_{ma} may also be determined by plotting on semi-log paper the pressure differentials ($P_{fa} - P_{ia}$) on the y-axis (abscissa) versus the distances (3, 15, 30 and 45 meters) from the wellhead on the x-axis (ordinate). Use a linear regression analysis to determine the distance when the pressure differential is zero. Additional pressure probes may be used to obtain more points on the semi-log plot of pressure differentials versus distances.

3.7.6 Calculate the depth (D_{st}) affected by the extraction well during the short term test as follows. If the computed value of D_{st} exceeds the depth of the landfill, set D_{st} equal to the

landfill depth.

$$D_{st} = WD + R_{ma}^2$$

where,

D_{st} = depth, m

WD = well depth, m

R_{ma} = maximum radius of influence, m

3.7.7 Calculate the void volume for the extraction well (V) as follows.

$$V = 0.40 \pi R_{ma}^2 D_{st}$$

where,

V = void volume of test well, m³

R_{ma} = maximum radius of influence, m

D_{st} = depth, m

3.7.8 Repeat the procedures in section 3.7 for each well.

3.8 Calculate the total void volume of the test wells (V_v) by summing the void volumes (V) of each well.

3.9 Long Term Testing. The purpose of long term testing is to determine the methane generation rate constant, k. Use the blower to extract LFG from the wells. If a single blower and flare assembly and common header system are used, open all control valves and set the blower vacuum equal to the highest stabilized blower vacuum demonstrated by any individual well in section 3.7. Every 8 hours, sample the LFG from the wellhead sample port, measure the gauge

pressures of the shallow pressure probes, the blower vacuum, the LFG flow rate, and use the criteria for infiltration in section 3.7.2 and Method 3C to check for infiltration. If infiltration is detected, do not reduce the blower vacuum, but reduce the LFG flow rate from the well by adjusting the control valve on the wellhead. Adjust each affected well individually. Continue until the equivalent of two total void volumes (V_v) have been extracted, or until $V_t = 2 V_v$.

3.9.1 Calculate V_t , the total volume of LFG extracted from the wells, as follows.

$$V_t = \sum_{i=1}^n 60 Q_i t_{vi}$$

where,

V_t = total volume of LFG extracted from wells, m^3

Q_i = LFG flow rate measured at orifice meter at the
 i^{th} interval, cubic meters per minute

t_{vi} = time of the i^{th} interval, hour (usually 8)

3.9.2 Record the final stabilized flow rate as Q_f . If, during the long term testing, the flow rate does not stabilize, calculate Q_f by averaging the last 10 recorded flow rates.

3.9.3 For each deep probe, convert each gauge pressure to absolute pressure as in section 3.7.4. Average these values and record as P_{sa} . For each probe, compare P_{ia} to P_{sa} . Determine the furthestmost point from the wellhead along each radial arm where $P_{sa} \leq P_{ia}$. This distance is the stabilized radius of influence. Average these values to determine the average

stabilized radius of influence (R_{sa}).

3.10 Determine the NMOC mass emission rate using the procedures in section 5.

3.11 Deactivation of pressure probe holes. Upon completion of measurements, if pressure probes are removed, restore the integrity of the landfill cover by backfilling and sealing to prevent venting of LFG to the atmosphere or air infiltration.

4. Calibrations

Gas Flow Measuring Device Calibration Procedure. Locate a standard pitot tube in line with a gas flow measuring device. Use the procedures in Method 2D, section 4, to calibrate the orifice meter. Method 3C may be used to determine the dry molecular weight. It may be necessary to calibrate more than one gas flow measuring device to bracket the landfill gas flow rates. Construct a calibration curve by plotting the pressure drops across the gas flow measuring device for each flow rate versus the average dry gas volumetric flow rate in cubic meters per minute of the gas. Use this calibration curve to determine the volumetric flow from the wells during testing.

5. Calculations

5.1 Nomenclature.

| | | |
|------------|---|---|
| A_{avg} | = | average age of the solid waste tested, year |
| A_i | = | age of solid waste in the i^{th} fraction, year |
| A | = | age of landfill, year |
| A_r | = | acceptance rate, megagrams per year |
| C_{NMOC} | = | NMOC concentration, ppmv as hexane ($C_{NMOC} = C_i/6$) |

| | | |
|-----------|---|---|
| C_t | = | NMOC concentration, ppmv (carbon equivalent) from Method 25C |
| D | = | depth affected by the test wells, m |
| D_{st} | = | depth affected by the test wells in the short term test, m |
| D_{LF} | = | landfill depth, m |
| f | = | fraction of decomposable solid waste in the landfill |
| f_i | = | fraction of the solid waste in the i^{th} section |
| k | = | methane generation rate constant, year ⁻¹ |
| L_o | = | methane generation potential, cubic meters per megagram |
| L_o' | = | revised methane generation potential to account for the amount of nondecomposable material in the landfill, cubic meters per megagram |
| M_i | = | mass of solid waste of the i^{th} section, megagrams |
| M_r | = | mass of decomposable solid waste affected by the test well, megagrams |
| M_w | = | number of wells |
| P_{bar} | = | atmospheric pressure, mm Hg |
| P_g | = | gauge pressure of the deep pressure probes, mm Hg |
| P_i | = | initial absolute pressure of the deep pressure probes during static testing, mm Hg |
| P_{ia} | = | average initial absolute pressure of the deep pressure probes during static testing, mm Hg |

| | | |
|----------|---|---|
| P_f | = | final absolute pressure of the deep pressure probes during short term testing, mm Hg |
| P_{fa} | = | average final absolute pressure of the deep pressure probes during short term testing, mm Hg |
| P_s | = | final absolute pressure of the deep pressure probes during long term testing, mm Hg |
| P_{sa} | = | average final absolute pressure of the deep pressure probes during long term testing, mm Hg |
| Q_B | = | required blow flow rate, cubic meters per minute |
| Q_f | = | final stabilized flow rate, cubic meters per minute |
| Q_i | = | LFG flow rate measured at orifice meter during the i^{th} interval, cubic meters per minute |
| Q_s | = | maximum LFG flow rate at each well determined by short term test, cubic meters per minute |
| Q_t | = | NMOC mass emission rate, cubic meters per minute |
| R_m | = | maximum radius of influence, m |
| R_{ma} | = | average maximum radius of influence, m |
| R_s | = | stabilized radius of influence for an individual well, m |
| R_{sa} | = | average stabilized radius of influence, m |
| t_i | = | age of section i , year |
| t_t | = | total time of long term testing, year |

| | | |
|----------------|---|---|
| V | = | void volume of test well, m ³ |
| V _r | = | volume of solid waste affected by the test well, m ³ |
| V _t | = | total volume of solid waste affected by the long term testing, m ³ |
| V _v | = | total void volume affected by test wells, m ³ |
| WD | = | well depth, m |
| ρ | = | solid waste density, m ³ (Assume 0.64 megagrams per cubic meter if data are unavailable) |

5.2 Use the following equation to calculate the depth affected by the test well. If using cluster wells, use the average depth of the wells for WD. If the value of D is greater than the depth of the landfill, set D equal to the landfill depth.

$$D = WD + R_{sa}$$

5.3 Use the following equation to calculate the volume of solid waste affected by the test well.

$$V_r = R_{sa}^2 \pi D$$

5.4 Use the following equation to calculate the mass affected by the test well.

$$M_r = V_r \rho$$

5.5 Modify L_0 to account for the nondecomposable solid waste in the landfill.

$$L_0' = f L_0$$

5.6 In the following equation, solve for k by iteration. A suggested procedure is to select a value for k , calculate the left side of the equation, and if not equal to zero, select another value for k . Continue this process until the left hand side of the equation equals zero, ± 0.001 .

$$k e^{-k} A_{\text{avg}} - (5.256 \times 10^5) \frac{Q_r}{2L_0' M_r} = 0$$

5.7 Use the following equation to determine landfill NMOC mass emission rate if the yearly acceptance rate of solid waste has been consistent (± 10 percent) over the life of the landfill.

$$Q_t = \frac{2L_0' A_r (1 - e^{-kA}) C_{\text{NMOC}}}{(5.256 \times 10^{11})}$$

5.8 Use the following equation to determine landfill NMOC mass emission rate if the acceptance rate has not been consistent over the life of the landfill.

$$Q_t = \frac{2kL_0' C_{\text{NMOC}}}{(5.256 \times 10^{11})} \sum_{i=1}^n M_i e^{-kt_i}$$

6. Bibliography

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2. Emcon Associates, Methane Generation and Recovery from Landfills. Ann Arbor Science, 1982.
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5. Letter and attachments from Briggum, S., Waste Management of North America, to Thorneloe, S., EPA. Response to July 28, 1988 request for additional information. August 18, 1988.
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APÉNDICE A MÉTODO 3A DEL 40 CRF PARTE 60

**EMISSION MEASUREMENT TECHNICAL INFORMATION CENTER
NSPS TEST METHOD**

**Method 3A - Determination of Oxygen and Carbon Dioxide Concentrations
in Emissions from Stationary Sources
(Instrumental Analyzer Procedure)**

1. APPLICABILITY AND PRINCIPLE

1.1 Applicability. This method is applicable to the determination of oxygen (O₂) and carbon dioxide (CO₂) concentrations in emissions from stationary sources only when specified within the regulations.

1.2 Principle. A sample is continuously extracted from the effluent stream: a portion of the sample stream is conveyed to an instrumental analyzer(s) for determination of O₂ and CO₂ concentration(s). Performance specifications and test procedures are provided to ensure reliable data.

2. RANGE AND SENSITIVITY

Same as in Method 6C, Sections 2.1 and 2.2, except that the span of the monitoring system shall be selected such that the average O₂ or CO₂ concentration is not less than 20 percent of the span.

3. DEFINITIONS

3.1 Measurement System. The total equipment required for the determination of the O₂ or CO₂ concentration. The measurement system consists of the same major subsystems as defined in Method 6C, Sections 3.1.1, 3.1.2, and 3.1.3.

3.2 Span, Calibration Gas, Analyzer Calibration Error, Sampling System Bias, Zero Drift, Calibration Drift, Response Time, and Calibration Curve. Same as in Method 6C, Sections 3.2 through 3.8, and 3.10.

3.3 Interference Response. The output response of the measurement system to a component in the sample gas, other than the gas component being measured.

4. MEASUREMENT SYSTEM PERFORMANCE SPECIFICATIONS

Same as in Method 6C, Sections 4.1 through 4.4.

5. APPARATUS AND REAGENTS

5.1 Measurement System. Any measurement system for O₂ or CO₂ that meets the specifications of this method. A schematic of an acceptable measurement system is shown in Figure 6C-1 of Method 6C. The essential components of the measurement system are described below:

5.1.1 Sample Probe. A leak-free probe of sufficient length to traverse the sample points.

5.1.2 Sample Line. Tubing to transport the sample gas from the probe to the moisture removal system. A heated sample line is not required for systems that measure the O₂ or CO₂ concentration on a dry basis, or transport dry gases.

5.1.3 Sample Transport Line, Calibration Valve Assembly, Moisture Removal System, Particulate Filter, Sample Pump, Sample Flow Rate Control, Sample Gas Manifold, and Data Recorder. Same as in Method 6C, Sections 5.1.3 through 5.1.9, and 5.1.11, except that the requirements to use stainless steel, Teflon, and nonreactive glass filters do not apply.

5.1.4 Gas Analyzer. An analyzer to determine continuously the O₂ or CO₂ concentration in the sample gas stream. The analyzer must meet the applicable performance specifications of Section 4. A means of controlling the analyzer flow rate and a device for determining proper sample flow rate (e.g., precision rotameter, pressure gauge downstream of all flow controls, etc.) shall be provided at the analyzer. The requirements for measuring and controlling the analyzer for measuring and controlling the analyzer flow rate are not applicable if data are presented that demonstrate the analyzer is insensitive to flow variations over the range encountered during the test.

5.2 Calibration Gases. The calibration gases for CO₂ analyzers shall be CO₂ in N₂ or CO₂ in air. Alternatively, CO₂/SO₂, O₂/SO₂, or O₂/CO₂/SO₂ gas mixtures in N₂ may be used. Three calibration gases, as specified in Sections 5.3.1 through 5.3.4 of Method 6C, shall be used. For O₂ monitors that cannot analyze zero gas, a calibration gas concentration equivalent to less than 10 percent of the span may be used in place of zero gas.

6. MEASUREMENT SYSTEM PERFORMANCE TEST PROCEDURES

Perform the following procedures before measurement of emissions

(Section 7).

6.1 Calibration Concentration Verification. Follow Section 6.1 of Method 6C, except if calibration gas analysis is required, use Method 3 and change the acceptance criteria for agreement among Method 3 results to 5 percent (or 0.2 percent by volume, whichever is greater).

6.2 Interference Response. Conduct an interference response test of the analyzer prior to its initial use in the field. Thereafter, recheck the measurement system if changes are made in the instrumentation that could alter

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Page 3

the interference response (e.g., changes in the type of gas detector). Conduct the interference response in accordance with Section 5.4 of Method 20.

6.3 Measurement System Preparation, Analyzer Calibration Error, Response Time, and Sampling System Bias Check. Follow Sections 6.2 through 6.4 of Method 6C.

7. EMISSION TEST PROCEDURE

7.1 Selection of Sampling Site and Sampling Points. Select a measurement site and sampling points using the same criteria that are applicable to tests performed using Method 3.

7.2 Sample Collection. Position the sampling probe at the first measurement point, and begin sampling at the same rate as that used during the response time test. Maintain constant rate sampling (i.e., ± 10 percent) during the entire run. The sampling time per run shall be the same as for tests conducted using Method 3 plus twice the average system response time. For each run, use only those measurements obtained after twice the response time of the measurement system has elapsed to determine the average effluent concentration.

7.3 Zero and Calibration Drift Test. Follow Section 7.4 of Method 6C.

8. QUALITY CONTROL PROCEDURES

The following quality control procedures are recommended when the results of this method are used for an emission rate correction factor, or excess air determination. The tester should select one of the following options for validating measurement results:

8.1 If both O_2 and CO_2 are measured using Method 3A, the procedures described in Section 4.4 of Method 3 should be followed to validate the O_2 and CO_2 measurement results.

8.2 If only O_2 is measured using Method 3A, measurements of the sample stream CO_2 concentration should be obtained at the sample by-pass vent

discharge using an Orsat or Fyrite analyzer, or equivalent. Duplicate samples should be obtained concurrent with at least one run. Average the duplicate Orsat or Fyrite analysis results for each run. Use the average CO₂ values for comparison with the O₂ measurements in accordance with the procedures described in Section 4.4 of Method 3.

8.3 If only CO₂ is measured using Method 3A, concurrent measurements of the sample stream CO₂ concentration should be obtained using an Orsat or Fyrite analyzer as described in Section 8.2. For each run, differences greater than 0.5 percent between the Method 3A results and the average of the duplicate Fyrite analysis should be investigated.

9. EMISSION CALCULATION

9.1 For all CO₂ analyzers, and for O₂ analyzers that can be calibrated with zero gas, follow Section 8 of Method 6C, except express all concentrations as percent, rather than ppm.

9.2 For O₂ analyzers that use a low-level calibration gas in place of a zero gas, calculate the effluent gas concentration using Equation 3A-1.

$$3A-1 \quad C_{gas} = \frac{C_{ma} - C_{oa}}{C_m - C_c} (\bar{C} - C_m) + C_{ma} \quad \text{Eq.}$$

Where:

C_{gas} = Effluent gas concentration, dry basis, percent.

C_{ma} = Actual concentration of the upscale calibration gas, percent.

C_{oa} = Actual concentration of the low-level calibration gas, percent.

C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, percent.

C_c = Average of initial and final system calibration bias check responses for the low level gas, percent.

\bar{C} = Average gas concentration indicated by the gas analyzer, dry basis, percent.

10. BIBLIOGRAPHY

Same as in Bibliography of Method 6C.

APÉNDICE A MÉTODO 3C DEL 40 CRF PARTE 60

METHOD 3C - DETERMINATION OF CARBON DIOXIDE, METHANE,
NITROGEN, AND OXYGEN FROM STATIONARY SOURCES

1. Applicability and Principle

1.1 Applicability. This method applies to the analysis of carbon dioxide (CO₂), methane (CH₄), nitrogen (N₂), and oxygen (O₂) in samples from municipal solid waste landfills and other sources when specified in an applicable subpart.

1.2 Principle. A portion of the sample is injected into a gas chromatograph (GC) and the CO₂, CH₄, N₂, and O₂ concentrations are determined by using a thermal conductivity detector (TCD) and integrator.

2. Range and Sensitivity

2.1 Range. The range of this method depends upon the concentration of samples. The analytical range of TCD's is generally between approximately 10 ppmv and the upper percent range.

2.2 Sensitivity. The sensitivity limit for a compound is defined as the minimum detectable concentration of that compound, or the concentration that produces a signal-to-noise ratio of three to one. For CO₂, CH₄, N₂, and O₂, the sensitivity limit is in the low ppmv range.

3. Interferences

Since the TCD exhibits universal response and detects all gas components except the carrier, interferences may occur. Choosing the appropriate GC or shifting the retention times by changing the column flow rate may help to eliminate resolution interferences.

To assure consistent detector response, helium is used to prepare calibration gases. Frequent exposure to samples or carrier gas containing oxygen may gradually destroy filaments.

4. Apparatus

4.1 Gas Chromatograph. GC having at least the following components:

4.1.1 Separation Column. Appropriate column(s) to resolve CO₂, CH₄, N₂, O₂, and other gas components that may be present in the sample.

4.1.2 Sample Loop. Teflon or stainless steel tubing of the appropriate diameter. NOTE: Mention of trade names or specific products does not constitute endorsement or recommendation by the U. S. Environmental Protection Agency.

4.1.3 Conditioning System. To maintain the column and sample loop at constant temperature.

4.1.4 Thermal Conductivity Detector.

4.2 Recorder. Recorder with linear strip chart. Electronic integrator (optional) is recommended.

4.3 Teflon Tubing. Diameter and length determined by connection requirements of cylinder regulators and the GC.

4.4 Regulators. To control gas cylinder pressures and flow rates.

4.5 Adsorption Tubes. Applicable traps to remove any O₂ from the carrier gas.

5. Reagents

5.1 Calibration and Linearity Gases. Standard cylinder gas mixtures for each compound of interest with at least three concentration levels spanning the range of suspected sample concentrations. The calibration gases shall be prepared in helium.

5.2 Carrier Gas. Helium, high-purity.

6. Analysis

6.1 Sample Collection. Use the sample collection procedures described in Methods 3 or 25C to collect a sample of landfill gas (LFG).

6.2 Preparation of GC. Before putting the GC analyzer into routine operation, optimize the operational conditions according to the manufacturer's specifications to provide good resolution and minimum analysis time. Establish the appropriate carrier gas flow and set the detector sample and reference cell flow rates at exactly the same levels. Adjust the column and detector temperatures to the recommended levels. Allow sufficient time for temperature stabilization. This may typically require 1 hour for each change in temperature.

6.3 Analyzer Linearity Check and Calibration. Perform this test before sample analysis. Using the gas mixtures in section 5.1, verify the detector linearity over the range of suspected sample concentrations with at least three points per compound of interest. This initial check may also serve as the initial instrument calibration. All subsequent calibrations may be performed using a single-point standard gas provided the calibration point is within 20 percent of the sample component concentration. For each instrument calibration, record the carrier and detector flow rates, detector filament and block temperatures, attenuation factor, injection time, chart speed, sample loop volume, and component concentrations. Plot a linear regression of the standard concentrations versus area values to obtain the response factor of each compound. Alternatively, response factors of uncorrected component concentrations (wet basis) may be generated using instrumental integration. NOTE: Peak height may be used instead of peak area throughout this method.

6.4 Sample Analysis. Purge the sample loop with sample, and allow to come to

atmospheric pressure before each injection. Analyze each sample in duplicate, and calculate the average sample area (A). The results are acceptable when the peak areas for two consecutive injections agree within 5 percent of their average. If they do not agree, run additional samples until consistent area data are obtained. Determine the tank sample concentrations according to section 7.2.

7. Calculations

Carry out calculations retaining at least one extra decimal figure beyond that of the acquired data. Round off results only after the final calculation.

7.1 Nomenclature.

| | | |
|------------------|---|--|
| A | = | average sample area |
| B _w | = | moisture content in the sample, fraction |
| C | = | component concentration in the sample, dry basis, ppmv |
| C _t | = | calculated NMOC concentration, ppmv C equivalent |
| C _{tm} | = | measured NMOC concentration, ppmv C equivalent |
| P _{bar} | = | barometric pressure, mm Hg |
| P _{ti} | = | gas sample tank pressure after evacuation, mm Hg absolute |
| P _t | = | gas sample tank pressure after sampling, but before pressurizing, mm Hg absolute |
| P _{tf} | = | final gas sample tank pressure after pressurizing, mm Hg absolute |
| P _w | = | vapor pressure of H ₂ O (from table 3C-1), mm Hg |
| T _{ti} | = | sample tank temperature before sampling, °K |
| T _t | = | sample tank temperature at completion of sampling, °K |

- T_{tf} = sample tank temperature after pressurizing, °K
 r = total number of analyzer injections of sample tank during analysis (where j
 = injection number, 1... r)
 R = Mean calibration response factor for specific sample component,
 area/ppmv

Table 3C-1. MOISTURE CORRECTION

| Temperature °C | Vapor Pressure of H ₂ O, mm Hg | Temperature, °C | Vapor Pressure of H ₂ O, mm Hg |
|----------------|--|-----------------|--|
| 4 | 6.1 | 18 | 15.5 |
| 6 | 7.0 | 20 | 17.5 |
| 8 | 8.0 | 22 | 19.8 |
| 10 | 9.2 | 24 | 22.4 |
| 12 | 10.5 | 26 | 25.2 |
| 14 | 12.0 | 28 | 28.3 |
| 16 | 13.6 | 30 | 31.8 |

7.2 Concentration of Sample Components. Calculate C for each compound using Equations 3C-1 and 3C-2. Use the temperature and barometric pressure at the sampling site to calculate B_w . If the sample was diluted with helium using the procedures in Method 25C, use Equation 3C-3 to calculate the concentration.

$$B_w = \frac{P_w}{P_{\text{bar}}} \quad 3C-1$$

$$C = \frac{A}{R(1-B_w)} \quad 3C-2$$

$$C = \left(\frac{\frac{P_{\text{tf}}}{T_{\text{tf}}}}{\frac{P_{\text{t}}}{T_{\text{t}}} - \frac{P_{\text{ti}}}{T_{\text{ti}}}} \right) \frac{A}{R(1-B_w)} \quad 3C-3$$

8. Bibliography

1. McNair, H.M., and E.J. Bonelli. Basic Gas Chromatography. Consolidated Printers, Berkeley, CA. 1969.

Plant _____ Date _____

Location _____

1. General information

Source temperature (°C) _____

Probe temperature (°C) _____

Ambient temperature (°C) _____

Atmospheric pressure (mm) _____

Source pressure ("Hg) _____

Absolute source pressure (mm) _____

Sampling rate (liter/min) _____

Sample loop volume (ml) _____

Sample loop temperature (°C) _____

Columnar temperature:
Initial (°C) time (min) _____
Program rate (°C/min) _____
Final (°C)/time (min) _____

Carrier gas flow rate (ml/min) _____

Detector temperature (°C) _____

Injection time (24-hour basis) _____

Chart speed (mm/min) _____

Dilution gas flow rate (ml/min) _____

Dilution gas used (symbol) _____

Dilution ratio _____

Figure 18-11. Field analysis data sheets.

Plant _____ Date _____

Site _____

| | Sample_1 | Sample_2 | Sample_3 |
|-----------------------------|----------|----------|----------|
| Source temperature (°C) | _____ | _____ | _____ |
| Barometric pressure (mm Hg) | _____ | _____ | _____ |
| Ambient temperature (°C) | _____ | _____ | _____ |
| Sample flow rate (appr.) | _____ | _____ | _____ |
| Bag number | _____ | _____ | _____ |
| Start time | _____ | _____ | _____ |
| Finish time | _____ | _____ | _____ |

Figure 18-10. Field sample data sheet - Tedlar bag collection method.



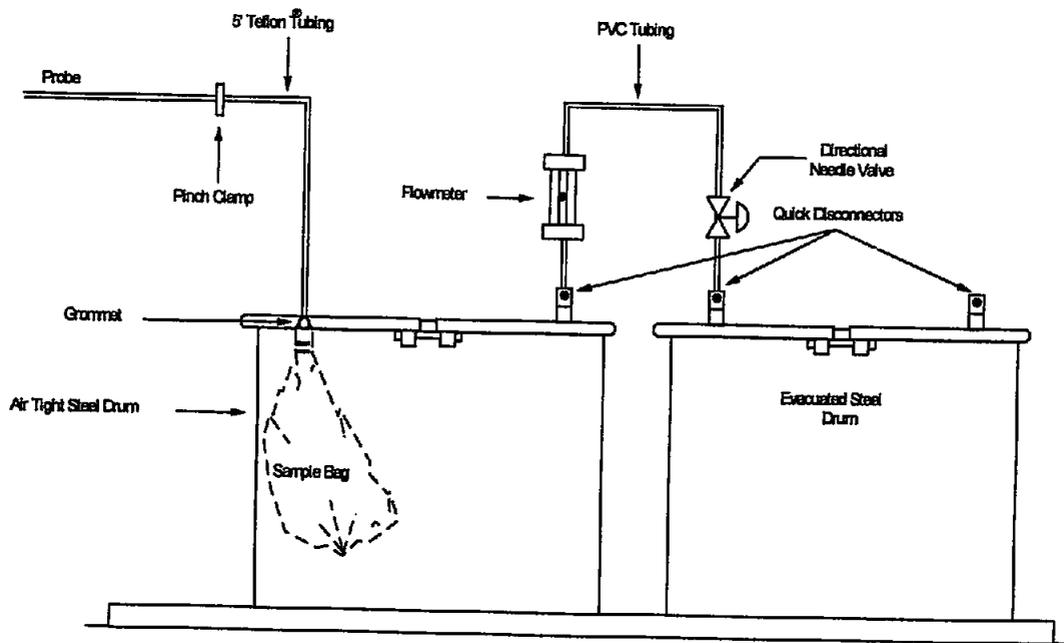


Figure 18-9a. Explosion Risk Gas Sampling Method.

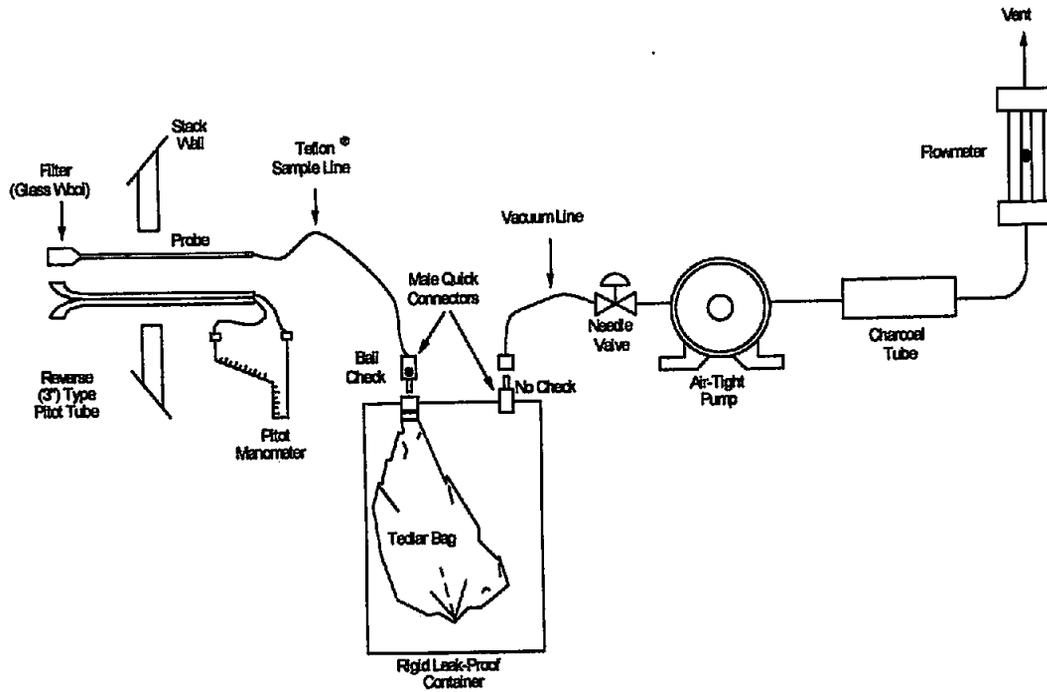


Figure 18-9. Integrated Bag Sampling Train.

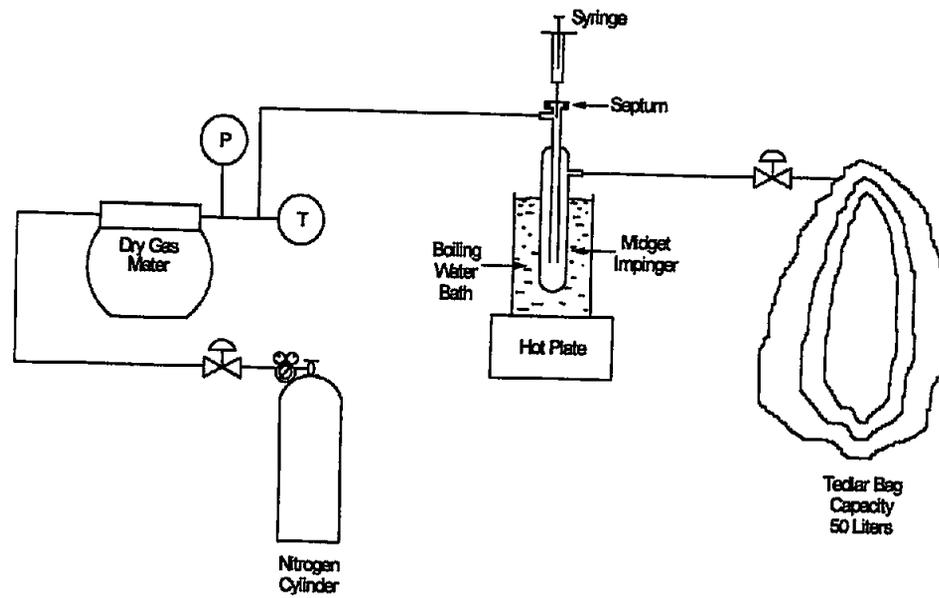


Figure 18-8. Apparatus for Preparation of Liquid Materials.

| Organic Peak Identification and Calculated Concentrations: | | | |
|--|--|--|--|
| Injection time (24-hour clock) | | | |
| Distance to peak (cm) | | | |
| Chart speed (cm/min) | | | |
| Retention time (min) | | | |
| Attenuation factor | | | |
| Peak area (mm ²) | | | |
| Peak area * attenuation factor | | | |

Plot peak area * attenuation factor against calculated concentration to obtain calibration curve.

Figure 18-7. Standards prepared by dilution of cylinder standard.

Preparation of Standards by Dilution of Cylinder Standard

| Cylinder Standard: | Organic | Certified Concentration | | |
|--|-----------|-------------------------|-----------|--|
| | | ppm | | |
| Standards Preparation Data: | Date: | | | |
| Stage 1 | Mixture 1 | Mixture 2 | Mixture 3 | |
| Standard gas flowmeter reading | | | | |
| Diluent gas flowmeter reading | | | | |
| Laboratory temperature (°K) | | | | |
| Barometric pressure (mm Hg) | | | | |
| Flowmeter gage pressure (mm Hg) | | | | |
| Flow rate cylinder gas at standard conditions (ml/min) | | | | |
| Flow rate diluent gas at standard conditions (ml/min) | | | | |
| Calculated concentration (ppm) | | | | |
| Stage 2 (if used) | | | | |
| Standard gas flowmeter reading | | | | |
| Diluent gas flowmeter reading | | | | |
| Flow rate Stage 1 gas at standard conditions (ml/min) | | | | |
| Flow rate diluent gas at standard conditions | | | | |
| Calculated concentration (ppm) | | | | |
| GC Operating Conditions: | | | | |
| Sample loop volume (ml) | | | | |
| Sample loop temperature (°C) | | | | |
| Carrier gas flow rate (ml/min) | | | | |
| Column temperature: | | | | |
| Initial (°C) | | | | |
| Program rate (°C/min) | | | | |
| Final (°C) | | | | |

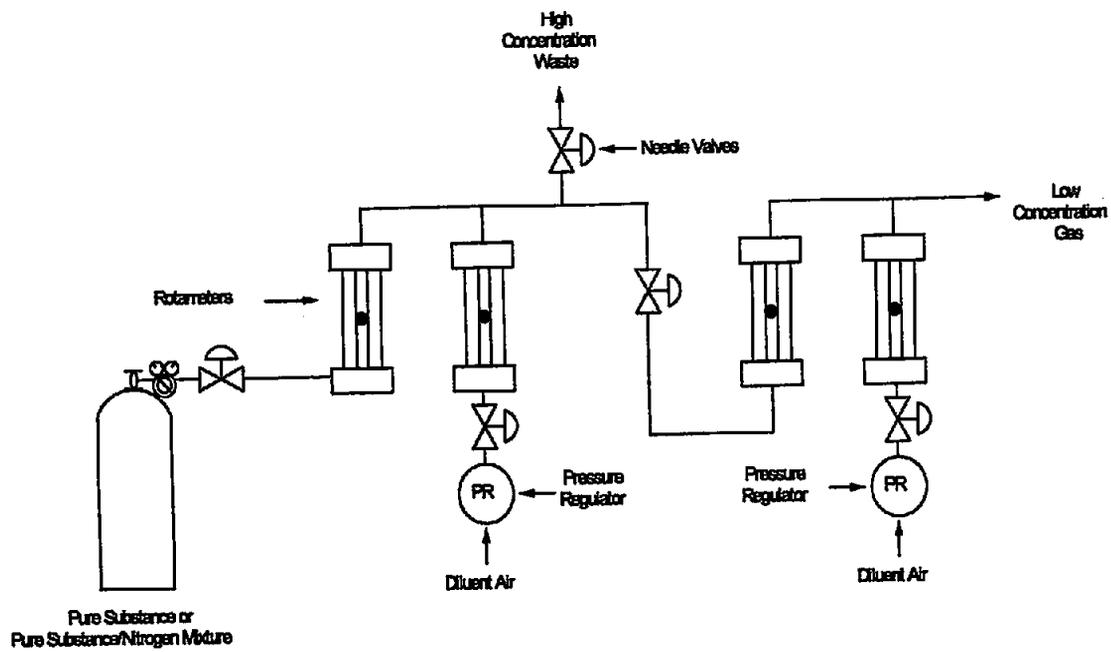


Figure 18-6. Two-Stage Dilution Apparatus.

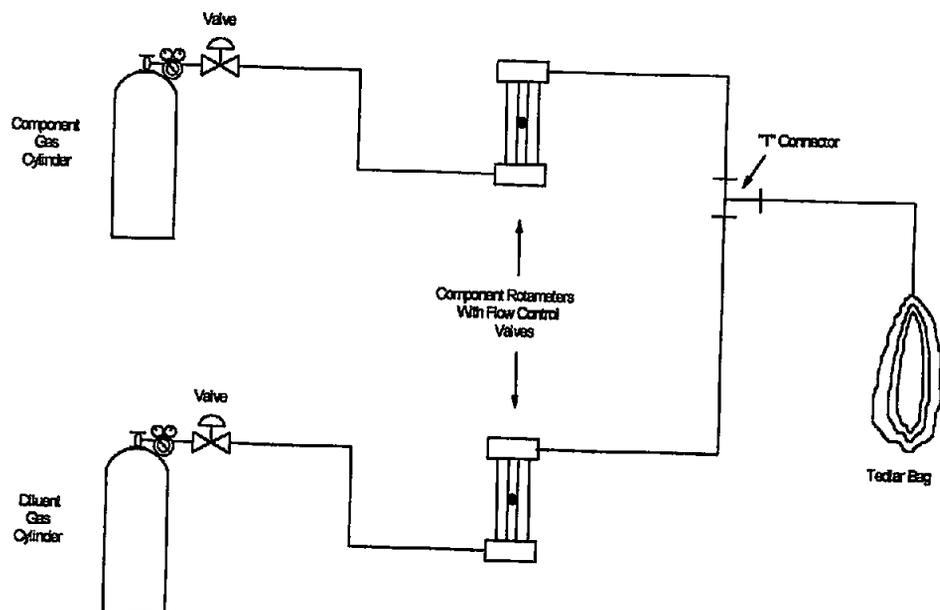


Figure 18-5. Single-Stage Calibration Gas Dilution System.

$$Q_{std} = Q_{lab} \left(\frac{760 \times T_{lab}}{P_{lab} \times 293} \right)^{1/2}$$

Flow rate
(laboratory conditions)

Flow rate
(STD_conditions)

Figure 18-4 (cont.). Flowmeter calibration.

Organic Peak Identification and Calculated Concentrations:

| | | | |
|---|--|--|--|
| Injection time (24 hour clock) | | | |
| Distance to peak (cm) | | | |
| Chart speed (cm/min) | | | |
| Organic retention time (min) | | | |
| Attenuation factor | | | |
| Peak height (mm) | | | |
| Peak area (mm ₂) | | | |
| Peak area * attenuation factor (mm ₂) | | | |
| Calculated concentration (ppm) (Equation 18-3 or 18-4) | | | |

Plot peak area * attenuation factor against calculated concentration to obtain calibration curve.

Figure 18-3 (cont.). Standards prepared in Tedlar bags and calibration curve.

Figure 18-3. Preparation of Standards in Tedlar Bags and Calibration Curve.

| Standards Preparation Data: | Standards | | |
|---|------------|------------|------------|
| | Mixture #1 | Mixture #2 | Mixture #3 |
| Organic: | | | |
| Bag number or identification | | | |
| Dry gas meter calibration factor | | | |
| Final meter reading (liters) | | | |
| Initial meter reading (liters) | | | |
| Metered volume (liters) | | | |
| Average meter temperature (°K) | | | |
| Average meter pressure, gauge (mm Hg) | | | |
| Average atmospheric pressure (mm Hg) | | | |
| Average meter pressure, absolute (mm Hg) | | | |
| Syringe temperature (°K) (see Section 6.2.2.1) | | | |
| Syringe pressure, absolute (mm Hg) (see Section 6.2.2.1) | | | |
| Volume of gas in syringe (ml) (Section 6.2.2.1) | | | |
| Density of liquid organic (g/ml) (Section 6.2.2.2) | | | |
| Volume of liquid in syringe (ml) (Section 6.2.2.2) | | | |

GC Operating Conditions:

| | | | |
|--------------------------------|--|--|--|
| Sample loop volume (ml) | | | |
| Sample loop temperature (°C) | | | |
| Carrier gas flow rate (ml/min) | | | |
| Column temperature | | | |
| Initial (°C) | | | |
| Rate change (°C/min) | | | |
| Final (°C) | | | |

Components_to_be_analyzed

Expected_concentration

Suggested chromatographic column _____

Column flow rate _____ ml/min

Head pressure _____ mm Hg

Column temperature:

Isothermal _____ °C

Programmed from _____ °C to _____ °C at _____ °C/min

Injection port/sample loop temperature _____ °C

Detector temperature _____ °C

Detector flow rates: Hydrogen _____ ml/min.

head pressure _____ mm Hg

Air/Oxygen _____ ml/min.

head pressure _____ mm Hg

Chart speed _____ inches/minute

Compound data:

Compound

Retention_time

Attenuation

Figure 18-2. Chromatographic conditions data sheet.

_____ ppm

C. Sampling considerations

Location to set up GC _____

Special hazards to be considered _____

Power available at duct _____

Power available for GC _____

Plant safety requirements _____

Vehicle traffic rules _____

Plant entry requirements _____

Security agreements _____

Potential problems _____

D. Site diagrams. (Attach additional sheets if required).

Figure 18-1 (continued). Preliminary survey data sheet.

III. Sampling site

A. Description

Site description _____

Duct shape and size _____

Material _____

Wall thickness _____ inches

Upstream distance _____ inches _____ diameter

Downstream distance _____ inches _____ diameter

Size of port _____

Size of access area _____

Hazards _____ Ambient temp. _____ °F

B. Properties of gas stream

Temperature _____ °C _____ °F, Data source _____

Velocity _____, Data source _____

Static pressure _____ inches H₂O, Data source _____

Moisture content _____ %, Data source _____

Particulate content _____, Data source _____

Gaseous components

N₂ _____ %

O₂ _____ %

CO _____ %

CO₂ _____ %

SO₂ _____ %

Hydrocarbons _____ ppm

Hydrocarbon components

_____ ppm

_____ ppm

_____ ppm

_____ ppm

_____ ppm

I. Name of company _____ Date _____

Address _____

Contacts _____ Phone _____

Process to be sampled _____

Duct or vent to be sampled _____

II. Process description _____

Raw material _____

Products _____

Operating cycle

Check: Batch _____ Continuous _____ Cyclic _____

Timing of batch or cycle _____

Best time to test _____

Figure 18-1. Preliminary survey data sheet.

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| Volume 1 - O17-033-00267-3/\$13 | Volume 5 - O17-033-00349-1/\$10, |
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| Volume 3 - O17-033-00261-4/\$14 | Volume 7 - O17-033-00396-5/\$7. |
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$$R = \frac{m_v \times v_s}{S}$$

where:

S = theoretical mass of compound spiked onto adsorbent in spiked train (μg).

7.6.3.1 Repeat the procedure in Section 7.6.3 twice more, for a total of three runs. In order for the adsorbent tube sampling and analytical procedure to be acceptable for a compound, $0.70 \leq R \leq 1.30$ (R in this case is the average of three runs). If the average R value does not meet this criterion for a target compound, the sampling technique is not acceptable for that compound, and therefore another sampling technique shall be evaluated for acceptance (by repeating the recovery study with another sampling technique). Report the R value in the test report and correct all field measurements with the calculated R value for that compound by using the following equation:

$$\text{Reported Result} = \frac{\text{Measured Concentration (ppm)}}{R}$$

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where:

- t = measured average concentration (ppm) of target compound and source sample (analysis results subsequent to bag spiking)
u = source sample average concentration (ppm) of target compound in the bag (analysis results before bag spiking)
s = theoretical concentration (ppm) of spiked target compound in the bag

For the bag sampling technique to be considered valid for a compound, $0.70 \leq R \leq 1.30$. If the R value does not meet this criterion for a target compound, the sampling technique is not acceptable for that compound, and therefore another sampling technique shall be evaluated for acceptance (by repeating the recovery study with another sampling technique). Report the R value in the test report and correct all field measurements with the calculated R value for that compound by using the following equation:

$$\text{Reported Result} = \frac{\text{Measured Concentration (ppm)}}{R}$$

7.6.3 Recovery Study for Adsorption Tube Sampling. If following the adsorption tube procedure in Section 7.4, conduct a recovery study of the compounds of interest during the actual field test. Set up two identical sampling trains. Collocate the two sampling probes in the stack. The probes shall be placed in the same horizontal plane, where the first probe tip is 2.5 cm from the outside edge of the other and with a pitot tube on the outside of each probe. One of the sampling trains shall be designated the spiked train and the other the unspiked train. Spike all of the compounds of interest (in gaseous or liquid form) onto the adsorbent tube(s) in the spiked train before sampling. The mass of each spiked compound shall be 40 to 60 percent of the mass expected to be collected with the unspiked train. Sample the stack gas into the two trains simultaneously. Analyze the adsorbents from the two trains utilizing the same analytical procedure and instrumentation. Determine the fraction of spiked compound recovered (R) using the following equations.

$$m_v = \frac{m_s}{v_s} - \frac{m_u}{v_u}$$

where:

- m_v = mass per volume of spiked compound measured ($\mu\text{g/L}$).
 m_s = total mass of compound measured on adsorbent with spiked train (μg).
 v_s = volume of stack gas sampled with spiked train (L).
 m_u = total mass of compound measured on adsorbent with unspiked train (μg).
 v_u = volume of stack gas sampled with unspiked train (L).

checks immediately after sampling with all sampling train components in place. Perform all leak-checks according to the manufacturer's instructions, and record the results. Use the bubble-tube flowmeter to measure the pump volume flow rate with the orifice used in the test sampling, and record the result. If it has changed by more than 5 but less than 20 percent, calculate an average flow rate for the test. If the flow rate has changed by more than 20 percent, recalibrate the pump and repeat the sampling.

7.4.4.5 Calculations. All calculations can be performed according to the respective NIOSH method. Correct all sample volumes to standard conditions. If a sample dilution system has been used, multiply the results by the appropriate dilution ratio. Correct all results according to the applicable procedure in Section 7.6. Report results as ppm by volume, dry basis.

7.5 Reporting of Results. At the completion of the field analysis portion of the study, ensure that the data sheets shown in Figure 18-11 have been completed. Summarize this data on the data sheets shown in Figure 18-15.

7.6 Recovery Study. After conducting the presurvey and identifying all of the pollutants of interest, conduct the appropriate recovery study during the test based on the sampling system chosen for the compounds of interest.

7.6.1 Recovery Study for Direct Interface or Dilution Interface Sampling. If the procedures in Section 7.2 or 7.3 are to be used to analyze the stack gas, conduct the calibration procedure as stated in Section 7.2.2 or 7.3.2, as appropriate. Upon successful completion of the appropriate calibration procedure, attach the mid-level calibration gas for at least one target compound to the inlet of the probe or as close as possible to the inlet of the probe, but before the filter. Repeat the calibration procedure by sampling and analyzing the mid-level calibration gas through the entire sampling and analytical system until two consecutive samples are within 5 percent of their mean value. The mean of the calibration gas response directly to the analyzer and the mean of the calibration gas response sampled through the probe shall be within 10 percent of each other. If the difference in the two means is greater than 10 percent, check for leaks throughout the sampling system and repeat the analysis of the standard through the sampling system until this criterion is met.

7.6.2 Recovery Study for Bag Sampling. Follow the procedures for the bag sampling and analysis in Section 7.1. After analyzing all three bag samples, choose one of the bag samples and analyze twice more (this bag will become the spiked bag). Spike the chosen bag sample with a known mixture (gaseous or liquid) of all of the target pollutants. Follow a procedure similar to the calibration standard preparation procedure listed in Section 6.2, as appropriate. The theoretical concentration, in ppm, of each spiked compound in the bag shall be 40 to 60 percent of the average concentration measured in the three bag samples. If a target compound was not detected in the bag samples, the concentration of that compound to be spiked shall be 5 times the limit of detection for that compound. Analyze the bag three times after spiking. Calculate the average fraction recovered (R) of each spiked target compound with the following equation:

$$R = \frac{t-u}{s}$$

7.4.1.7 Barometer. Accurate to 5 mm Hg, to measure atmospheric pressure during sampling and pump calibration.

7.4.1.8 Rotameter. 0 to 100 cc/min, to detect changes in flow rate during sampling.

7.4.2 Sampling and Analysis. It is suggested that the tester follow the sampling and analysis portion of the respective NIOSH method section entitled "Procedure." Calibrate the pump and limiting orifice flow rate through adsorption tubes with the bubble tube flowmeter before sampling. The sample system can be operated as a "recirculating loop" for this operation. Record the ambient temperature and barometric pressure. Then, during sampling, use the rotameter to verify that the pump and orifice sampling rate remains constant.

Use a sample probe, if required, to obtain the sample at the centroid of the duct, or at a point no closer to the walls than 1 m. Minimize the length of flexible tubing between the probe and adsorption tubes. Several adsorption tubes can be connected in series, if the extra adsorptive capacity is needed. Provide the gas sample to the sample system at a pressure sufficient for the limiting orifice to function as a sonic orifice. Record the total time and sample flow rate (or the number of pump strokes), the barometric pressure, and ambient temperature. Obtain a total sample volume commensurate with the expected concentration(s) of the volatile organic(s) present, and recommended sample loading factors (weight sample per weight adsorption media). Laboratory tests prior to actual sampling may be necessary to predetermine this volume. When more than one organic is present in the emissions, then develop relative adsorptive capacity information. If water vapor is present in the sample at concentrations above 2 to 3 percent, the adsorptive capacity may be severely reduced. Operate the gas chromatograph according to the manufacturer's instructions. After establishing optimum conditions, verify and document these conditions during all operations. Analyze the audit samples (see Section 7.4.4.3), then the emission samples. Repeat the analysis of each sample until the relative deviation of two consecutive injections does not exceed 5 percent.

7.4.3 Standards and Calibration. The standards can be prepared according to the respective NIOSH method. Use a minimum of three different standards; select the concentrations to bracket the expected average sample concentration. Perform the calibration before and after each day's sample analyses. Prepare the calibration curve by using the least squares method.

7.4.4 Quality Assurance.

7.4.4.1 Determine the recovery efficiency of the pollutants of interest according to Section 7.6.

7.4.4.2 Determination of Sample Collection Efficiency. For the source samples, analyze the primary and backup portions of the adsorption tubes separately. If the backup portion exceeds 10 percent of the total amount (primary and back-up), repeat the sampling with a larger sampling portion.

7.4.4.3 Analysis Audit. Immediately before the sample analyses, analyze the two audits in accordance with Section 7.4.2. The analysis audit shall agree with the audit concentration within 10 percent.

7.4.4.4 Pump Leak Checks and Volume Flow Rate Checks. Perform both of these

system to provide the desired dilution factors. Make this correction by diluting a high-concentration standard gas mixture to adjust the dilution ratio as required.

Once the dilution system and GC operations are satisfactory, proceed with the analysis of source gas, maintaining the same dilution settings as used for the standards. Repeat the analyses until two consecutive values do not vary by more than 5 percent from their mean value are obtained.

Repeat the analysis of the calibration gas mixtures to verify equipment operation. Analyze the two field audit samples using either the dilution system, or directly connect to the gas sampling valve as required. Record all data and report the results to the audit supervisor.

7.3.3 Determination of Stack Gas Moisture Content. Same as Section 7.2.3.

7.3.4 Quality Assurance. Same as Section 7.2.4.

7.3.5 Emission Calculations. Same as section 7.2.5, with the dilution factor applied.

7.4 Adsorption Tube Procedure (Alternative Procedure). It is suggested that the tester refer to the National Institute for Occupational Safety and Health (NIOSH) method for the particular organics to be sampled. The principal interferent will be water vapor. If water vapor is present at concentrations above 3 percent, silica gel should be used in front of the charcoal. Where more than one compound is present in the emissions, then develop relative adsorptive capacity information.

7.4.1 Additional Apparatus. In addition to the equipment listed in the NIOSH method for the particular organic(s) to be sampled, the following items (or equivalent) are suggested.

7.4.1.1 Probe (Optional). Borosilicate glass or stainless steel, approximately 6-mm ID, with a heating system if water condensation is a problem, and a filter (either in-stack or out-stack heated to stack temperature) to remove particulate matter. In most instances, a plug of glass wool is a satisfactory filter.

7.4.1.2 Flexible Tubing. To connect probe to adsorption tubes. Use a material that exhibits minimal sample adsorption.

7.4.1.3 Leakless Sample Pump. Flow controlled, constant rate pump, with a set of limiting (sonic) orifices to provide pumping rates from approximately 10 to 100 cc/min.

7.4.1.4 Bubble-Tube Flowmeter. Volume accuracy within +1 percent, to calibrate pump.

7.4.1.5 Stopwatch. To time sampling and pump rate calibration.

7.4.1.6 Adsorption Tubes. Similar to ones specified by NIOSH, except the amounts of adsorbent per primary/backup sections are 800/200 mg for charcoal tubes and 1040/260 mg for silica gel tubes. As an alternative, the tubes may contain a porous polymer adsorbent such as Tenax GC or XAD-2.

7.3.1 Apparatus. The equipment required in addition to that specified for the direct interface system is as follows:

7.3.1.1 Sample Pump. Leakless Teflon-coated diaphragm-type that can withstand being heated to 120°C and deliver 1.5 liters/minute.

7.3.1.2 Dilution Pumps. Two Model A-150 Komhyr Teflon positive displacement type delivering 150 cc/minute, or equivalent. As an option, calibrated flowmeters can be used in conjunction with Teflon-coated diaphragm pumps.

7.3.1.3 Valves. Two Teflon three-way valves, suitable for connecting to 6.4-mm OD Teflon tubing.

7.3.1.4 Flowmeters. Two, for measurement of diluent gas, expected delivery flow rate to be 1,350 cc/min.

7.3.1.5 Diluent Gas with Cylinders and Regulators. Gas can be nitrogen or clean dry air, depending on the nature of the source gases.

7.3.1.6 Heated Box. Suitable for being heated to 120°C, to contain the three pumps, three-way valves, and associated connections. The box should be equipped with quick connect fittings to facilitate connection of: (1) the heated sample line from the probe, (2) the gas sampling valve, (3) the calibration gas mixtures, and (4) diluent gas lines. A schematic diagram of the components and connections is shown in Figure 18-13.

(Note: Care must be taken to leak-check the system prior to the dilutions so as not to create a potentially explosive atmosphere.)

The heated box shown in Figure 18-13 is designed to receive a heated line from the probe. An optional design is to build a probe unit that attaches directly to the heated box. In this way, the heated box contains the controls for the probe heaters, or, if the box is placed against the duct being sampled, it may be possible to eliminate the probe heaters. In either case, a heated Teflon line is used to connect the heated box to the gas sampling valve on the chromatograph.

7.3.2 Procedure. Assemble the apparatus by connecting the heated box, shown in Figure 18-13, between the heated sample line from the probe and the gas sampling valve on the chromatograph. Vent the source gas from the gas sampling valve directly to the charcoal filter, eliminating the pump and rotameter. Heat the sample probe, sample line, and heated box. Insert the probe and source thermocouple at the centroid of the duct, or to a point no closer to the walls than 1 m. Measure the source temperature, and adjust all heating units to a temperature 0 to 3°C above this temperature. If this temperature is above the safe operating temperature of the Teflon components, adjust the heating to maintain a temperature high enough to prevent condensation of water and organic compounds. Verify the operation of the dilution system by analyzing a high concentration gas of known composition through either the 10:1 or 100:1 dilution stages, as appropriate. (If necessary, vary the flow of the diluent gas to obtain other dilution ratios.) Determine the concentration of the diluted calibration gas using the dilution factor and the calibration curves prepared in the laboratory. Record the pertinent data on the data sheet shown in Figure 18-11. If the data on the diluted calibration gas are not within 10 percent of the expected values, determine whether the chromatograph or the dilution system is in error, and correct it. Verify the GC operation using a low concentration standard by diverting the gas into the sample loop, bypassing the dilution system. If these analyses are not within acceptable limits, correct the dilution

7.2.1.9 Charcoal Adsorber. To adsorb organic vapor collected from the source to prevent exposure of personnel to source gas.

7.2.1.10 Gas Cylinders. Carrier gas (helium or nitrogen), and oxygen and hydrogen for a flame ionization detector (FID) if one is used.

7.2.1.11 Gas Chromatograph. Capable of being moved into the field, with detector, heated gas sampling valve, column required to complete separation of desired components, and option for temperature programming.

7.2.1.12 Recorder/Integrator. To record results.

7.2.2 Procedure. To obtain a sample, assemble the sampling system as shown in Figure 18-12. Make sure all connections are tight. Turn on the probe and sample line heaters. As the temperature of the probe and heated line approaches the source temperature as indicated on the thermocouple readout device, control the heating to maintain a temperature of 0 to 3°C above the source temperature. While the probe and heated line are being heated, disconnect the sample line from the gas sampling valve, and attach the line from the calibration gas mixture. Flush the sample loop with calibration gas and analyze a portion of that gas. Record the results. After the calibration gas sample has been flushed into the GC instrument, turn the gas sampling valve to flush position, then reconnect the probe sample line to the valve. Place the inlet of the probe at the centroid of the duct, or at a point no closer to the walls than 1 m, and draw source gas into the probe, heated line, and sample loop. After thorough flushing, analyze the sample using the same conditions as for the calibration gas mixture. Repeat the analysis on an additional sample. Measure the peak areas for the two samples, and if they do not agree to within 5 percent of their mean value, analyze additional samples until two consecutive analyses meet this criteria. Record the data. After consistent results are obtained, remove the probe from the source and analyze a second calibration gas mixture. Record this calibration data and the other required data on the data sheet shown in Figure 18-11, deleting the dilution gas information.

(NOTE: Take care to draw all samples, calibration mixtures, and audits through the sample loop at the same pressure.)

7.2.3 Determination of Stack Gas Moisture Content. Use Method 4 to measure the stack gas moisture content.

7.2.4 Quality Assurance. Same as Section 7.1.7. Introduce the audit gases in the sample line immediately following the probe.

7.2.5 Emission Calculations. Same as Section 7.1.8.

7.3 Dilution Interface Sampling and Analysis Procedure. Source samples that contain a high concentration of organic materials may require dilution prior to analysis to prevent saturating the GC detector. The apparatus required for this direct interface procedure is basically the same as that described in the Section 7.2, except a dilution system is added between the heated sample line and the gas sampling valve. The apparatus is arranged so that either a 10:1 or 100:1 dilution of the source gas can be directed to the chromatograph. A pump of larger capacity is also required, and this pump must be heated and placed in the system between the sample line and the dilution apparatus.

$$C_c = \frac{C_s P_r T_i F_r}{P_i T_r (1 - B_{ws})} \quad \text{Eq. 18-5}$$

where:

- C_s = Concentration of the organic from the calibration curve, ppm.
 P_r = Reference pressure, the barometric pressure or absolute sample loop pressure recorded during calibration, mm Hg.
 T_i = Sample loop temperature at the time of sample analysis, °K.
 F_r = Relative response factor (if applicable, see Section 6.4).
 P_i = Barometric or absolute sample loop pressure at time of sample analysis, mm Hg.
 T_r = Reference temperature, the temperature of the sample loop recorded during calibration, °K.
 B_{ws} = Water vapor content of the bag sample or stack gas, proportion by volume.

7.2 Direct Interface Sampling and Analysis Procedure. The direct interface procedure can be used provided that the moisture content of the gas does not interfere with the analysis procedure, the physical requirements of the equipment can be met at the site, and the source gas concentration is low enough that detector saturation is not a problem. Adhere to all safety requirements with this method.

7.2.1 Apparatus.

7.2.1.1 Probe. Constructed of stainless steel, Pyrex glass, or Teflon tubing as required by duct temperature, 6.4-mm OD. enlarged at duct end to contain glass wool plug. If necessary, heat the probe with heating tape or a special heating unit capable of maintaining duct temperature.

7.2.1.2 Sample Lines. 6.4-mm OD Teflon lines, heat-traced to prevent condensation of material.

7.2.1.3 Quick Connects. To connect sample line to gas sampling valve on GC instrument and to pump unit used to withdraw source gas. Use a quick connect or equivalent on the cylinder or bag containing calibration gas to allow connection of the calibration gas to the gas sampling valve.

7.2.1.4 Thermocouple Readout Device. Potentiometer or digital thermometer, to measure source temperature and probe temperature.

7.2.1.5 Heated Gas Sampling Valve. Of two-position, six-port design, to allow sample loop to be purged with source gas or to direct source gas into the GC instrument.

7.2.1.6 Needle Valve. To control gas sampling rate from the source.

7.2.1.7 Pump. Leakless Teflon-coated diaphragm-type pump or equivalent, capable of at least 1 liter/minute sampling rate.

7.2.1.8 Flowmeter. Of suitable range to measure sampling rate.

concentration.

7.1.5 Analysis of Bag Samples.

7.1.5.1 Apparatus. Same as Section 5. A minimum of three gas standards are required.

7.1.5.2 Procedure. Establish proper GC operating conditions as described in Section 6.3, and record all data listed in Figure 18-7. Prepare the GC so that gas can be drawn through the sample valve. Flush the sample loop with gas from one of the three Tedlar bags containing a calibration mixture, and activate the valve. Obtain at least two chromatograms for the mixture. The results are acceptable when the peak areas from two consecutive injections agree to within 5 percent of their average. If they do not agree, run additional samples or correct the analytical techniques until this requirement is met. Then analyze the other two calibration mixtures in the same manner. Prepare a calibration curve as described in the same manner. Prepare a calibration curve as described in Section 6.3. If the results are acceptable, analyze the other two calibration gas mixtures in the same manner. Prepare the calibration curve by using the least squares method.

Analyze the two field audit samples as described in Section 6.5 by connecting each Tedlar bag containing an audit gas mixture to the sampling valve. Calculate the results; record and report the data to the audit supervisor. If the results are acceptable, proceed with the analysis of the source samples.

Analyze the source gas samples by connecting each bag to the sampling valve with a piece of Teflon tubing identified with that bag. Follow the restrictions on replicate samples specified for the calibration gases. Record the data in Figure 18-11. If certain items do not apply, use the notation "N.A.". If the bag has been maintained at an elevated temperature as described in Section 7.1.4, determine the stack gas water content by Method 4. After all samples have been analyzed, repeat the analysis of the calibration gas mixtures, and generate a second calibration curve. Use an average of the two curves to determine the sample second calibration curve gas concentrations. If the two calibration curves differ by more than 5 percent from their mean value, then report the final results by comparison to both calibration curves.

7.1.6 Determination of Bag Water Vapor Content. Measure the ambient temperature and barometric pressure near the bag. From a water saturation vapor pressure table, determine and record the water vapor content of the bag as a decimal figure. (Assume the relative humidity to be 100 percent unless a lesser value is known.) If the bag has been maintained at an elevated temperature as described in Section 7.1.4, determine the stack gas water content by Method 4.

7.1.7 Quality Assurance. Immediately prior to the analysis of the stack gas samples, perform audit analyses as described in Section 6.5. The audit analyses must agree with the audit concentrations within 10 percent. If the results are acceptable, proceed with the analyses of the source samples. If they do not agree within 10 percent, then determine the reason for the discrepancy, and take corrective action before proceeding.

7.1.8 Emission Calculations. From the average calibration curve described in Section 7.1.5, select the value of C_s that corresponds to the peak area. Calculate the concentration C_c in ppm, dry basis, of each organic in the sample as follows:

7.1.1.1.6 Flowmeter. 0 to 500-ml flow range; with manufacturer's calibration curve.

7.1.1.2 Sampling Procedure. To obtain a sample, assemble the sample train as shown in Figure 18-9. Leak check both the bag and the container. Connect the vacuum line from the needle valve to the Teflon sample line from the probe. Place the end of the probe at the centroid of the stack or at a point no closer to the walls than 1 m, and start the pump with the needle valve adjusted to yield a flow of 0.5 liter/minute. After allowing sufficient time to purge the line several times, connect the vacuum line to the bag, and evacuate until the rotameter indicates no flow. Then position the sample and vacuum lines for sampling, and begin the actual sampling, keeping the rate proportional to the stack velocity. As a precaution, direct the gas exiting the rotameter away from sampling personnel. At the end of the sample period, shut off the pump, disconnect the sample line from the bag, and disconnect the vacuum line from the bag container. Record the source temperature, barometric pressure, ambient temperature, sampling flow rate, and initial and final sampling time on the data sheet shown in Figure 18-10. Protect the Tedlar bag and its container from sunlight. When possible, perform the analysis within 2 hours of sample collection.

7.1.2 Direct Pump Sampling Procedure. Follow 7.1.1, except place the pump and needle valve between the probe and the bag. Use a pump and needle valve constructed of stainless steel or some other material not affected by the stack gas. Leak-check the system, and then purge with stack gas before connecting to the previously evacuated bag.

7.1.3 Explosion Risk Area Bag Sampling Procedure. Follow 7.1.1 except replace the pump with another evacuated can (see Figure 18-9a). Use this method whenever there is a possibility of an explosion due to pumps, heated probes, or other flame producing equipment.

7.1.4 Other Modified Bag Sampling Procedures. In the event that condensation is observed in the bag while collecting the sample and a direct interface system cannot be used, heat the bag during collection, and maintain it at a suitably elevated temperature during all subsequent operations. (NOTE: Take care to leak-check the system prior to the dilutions so as not to create a potentially explosive atmosphere.) As an alternative, collect the sample gas, and simultaneously dilute it in the Tedlar bag.

In the first procedure, heat the box containing the sample bag to the source temperature, provided the components of the bag and the surrounding box can withstand this temperature. Then transport the bag as rapidly as possible to the analytical area while maintaining the heating, or cover the box with an insulating blanket. In the analytical area, keep the box heated to source temperature until analysis. Be sure that the method of heating the box and the control for the heating circuit are compatible with the safety restrictions required in each area.

To use the second procedure, prefill the Tedlar bag with a known quantity of inert gas. Meter the inert gas into the bag according to the procedure for the preparation of gas concentration standards of volatile liquid materials (Section 6.2.2.2), but eliminate the midget impinger section. Take the partly filled bag to the source, and meter the source gas into the bag through heated sampling lines and a heated flowmeter, or Teflon positive displacement pump. Verify the dilution factors periodically through dilution and analysis of gases of known

tester may obtain audit cylinders by contacting: U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Quality Assurance Division (MD-77), Research Triangle Park, North Carolina 27711. Audit cylinders obtained from a commercial gas manufacturer may be used provided that (a) the gas manufacturer certifies the audit cylinder in a manner similar to the procedure described in 40 CFR Part 61, Appendix B, Method 106, Section 5.2.3.1, and (b) the gas manufacturer obtains an independent analysis of the audit cylinders to verify this analysis. Independent analysis is defined as an analysis performed by an individual other than the individual who performs the gas manufacturer's analysis, while using calibration standards and analysis equipment different from those used for the gas manufacturer's analysis. Verification is complete and acceptable when the independent analysis concentration is within 5 percent of the gas manufacturer's concentration.

7. FINAL SAMPLING AND ANALYSIS PROCEDURE

Considering safety (flame hazards) and the source conditions, select an appropriate sampling and analysis procedure (Section 7.1, 7.2, 7.3 or 7.4). In situations where a hydrogen flame is a hazard and no intrinsically safe GC is suitable, use the flexible bag collection technique or an adsorption technique. If the source temperature is below 100°C, and the organic concentrations are suitable for the detector to be used, use the direct interface method. If the source gases require dilution, use a dilution interface and either the bag sample or adsorption tubes. The choice between these two techniques will depend on the physical layout of the site, the source temperature, and the storage stability of the compounds if collected in the bag. Sample polar compounds by direct interfacing or dilution interfacing to prevent sample loss by adsorption on the bag.

7.1 Integrated Bag Sampling and Analysis.

7.1.1 Evacuated Container Sampling Procedure. In this procedure, the bags are filled by evacuating the rigid air-tight container holding the bags. Use a field sample data sheet as shown in Figure 18-10. Collect triplicate sample from each sample location.

7.1.1.1 Apparatus.

7.1.1.1.1 Probe. Stainless steel, Pyrex glass, or Teflon tubing probe, according to the duct temperature, with 6.4-mm OD Teflon tubing of sufficient length to connect to the sample bag. Use stainless steel or Teflon unions to connect probe and sample line.

7.1.1.1.2 Quick Connects. Male (2) and female (2) of stainless steel construction.

7.1.1.1.3 Needle Valve. To control gas flow.

7.1.1.1.4 Pump. Leakless Teflon-coated diaphragm-type pump or equivalent. To deliver at least 1 liter/min.

7.1.1.1.5 Charcoal Adsorption Tube. Tube filled with activated charcoal, with glass wool plugs at each end, to adsorb organic vapors.

20°C may be used.

Calculate each organic standard concentration, C_s in ppm as follows:

$$C_s = \frac{\frac{L_v}{M} \rho (24.055 \times 10^6)}{V_m Y \frac{293}{T_m} \frac{P_m}{760} 1000} = 6.24 \times 10^4 \frac{L_v \rho T_m}{M V_m Y P_m} \quad \text{Eq. 18-4}$$

where:

- L_v = Liquid volume of organic injected, μl .
- ρ = Liquid organic density as determined, g/ml.
- M = Molecular weight of organic, g/g-mole.
- 24.055 = Ideal gas molar volume at 293 °K and 760 mm Hg, liters/g-mole.
- 10^6 = conversion to ppm.
- 1000 = Conversion factor, $\mu\text{l}/\text{ml}$.

6.3 Preparation of Calibration Curves. Establish proper GC conditions, then flush the sampling loop for 30 seconds at a rate of 100 ml/min. Allow the sample loop pressure to equilibrate to atmospheric pressure, and activate the injection valve. Record the standard concentration, attenuator factor, injection time, chart speed, retention time, peak area, sample loop temperature, column temperature, and carrier gas flow rate. Repeat the standard injection until two consecutive injections give area counts within 5 percent of their average. The average value multiplied by the attenuator factor is then the calibration area value for the concentration.

Repeat this procedure for each standard. Prepare a graphical plot of concentration (C_s) versus the calibration area values. Perform a regression analysis, and draw the least square line.

6.4 Relative Response Factors. The calibration curve generated from the standards for a single organic can usually be related to each of the individual GC response curves that are developed in the laboratory for all the compounds in the source. In the field, standards for that single organic can then be used to "calibrate" the GC for all the organics present. This procedure should first be confirmed in the laboratory by preparing and analyzing calibration standards containing multiple organic compounds.

6.5 Quality Assurance for Laboratory Procedures. Immediately after the preparation of the calibration curves and prior to the presurvey sample analysis, the analysis audit described in 40 CFR Part 61, Appendix C, Procedure 2: "Procedure for Field Auditing GC Analysis," should be performed. The information required to document the analysis of the audit samples has been included on the example data sheets shown in Figures 18-3 and 18-7. The audit analyses should agree with the audit concentrations within 10 percent. When available, the

where:

- G_v = Gas volume or organic compound injected, ml.
 10^6 = Conversion to ppm.
 P_s = Absolute pressure of syringe before injection, mm Hg.
 T_s = Absolute temperature of syringe before injection, °K.
 V_m = Gas volume indicated by dry gas meter, liters.
 Y = Dry gas meter calibration factor, dimensionless.
 P_m = Absolute pressure of dry gas meter, mm Hg.
 T_m = Absolute temperature of dry gas meter, °K.
1000 = Conversion factor, ml/liter.

6.2.2.2 Liquid Injection Technique. Use the equipment shown in Figure 18-8. Calibrate the dry gas meter as described in Section 6.2.2.1 with a set test meter or a spirometer. Use a water manometer for the pressure gauge and glass, Teflon, brass, or stainless steel for all connections. Connect a valve to the inlet of the 50-liter Tedlar bag.

To prepare the standards, assemble the equipment as shown in Figure 18-8, and leak-check the system. Completely evacuate the bag. Fill the bag with hydrocarbon-free air, and evacuate the bag again. Close the inlet valve.

Turn on the hot plate, and allow the water to reach boiling. Connect the bag to the impinger outlet. Record the initial meter reading, open the bag inlet valve, and open the cylinder. Adjust the rate so that the bag will be completely filled in approximately 15 minutes. Record meter pressure and temperature, and local barometric pressure.

Allow the liquid organic to equilibrate to room temperature. Fill the 1.0- or 10-microliter syringe to the desired liquid volume with the organic. Place the syringe needle into the impinger inlet using the septum provided, and inject the liquid into the flowing air stream. Use a needle of sufficient length to permit injection of the liquid below the air inlet branch of the tee. Remove the syringe.

When the bag is filled, stop the pump, and close the bag inlet valve. Record the final meter reading, temperature, and pressure.

Disconnect the bag from the impinger outlet, and either set it aside for at least 1 hour, or massage the bag to insure complete mixing.

Measure the solvent liquid density at room temperature by accurately weighing a known volume of the material on an analytical balance to the nearest 1.0 milligram. A ground-glass stoppered 25-ml volumetric flask or a glass-stoppered specific gravity bottle is suitable for weighing. Calculate the result in terms of g/ml. As an alternative, literature values of the density of the liquid at

$$C_s = 10^6 \bar{X} \left(\frac{q_{c1}}{q_{c1} + q_{d1}} \right) \left(\frac{q_{c2}}{q_{c2} + q_{d2}} \right) \quad \text{Eq. 18-2}$$

where:

- 10^6 = Conversion to ppm.
 \bar{X} = Mole or volume fraction of the organic in the calibration gas to be diluted.
 q_{c1} = Flow rate of the calibration gas to be diluted in stage 1.
 q_{c2} = Flow rate of the calibration gas to be diluted in stage 2.
 q_{d1} = Flow rate of diluent gas in stage 1.
 q_{d2} = Flow rate of diluent gas in stage 2.

Further details of the calibration methods for flowmeters and the dilution system can be found in Citation 21 in the Bibliography.

6.2.2 Preparation of Standards from Volatile Materials. Record all data shown on Figure 18-3.

6.2.2.1 Gas Injection Technique. This procedure is applicable to organic compounds that exist entirely as a gas at ambient conditions. Evacuate a 10-liter Tedlar bag that has passed a leak-check (see Section 7.1), and meter in 5.0 liters of air or nitrogen through a dry gas meter that has been calibrated in a manner consistent with the procedure described in Section 5.1.1 of Method 5. While the bag is filling use a 0.5-ml syringe to inject a known quantity of "pure" gas of the organic compound through the wall of the bag, or through a septum-capped tee at the bag inlet. Withdraw the syringe needle, and immediately cover the resulting hole with a piece of masking tape. In a like manner, prepare dilutions having other concentrations. Prepare a minimum of three concentrations. Prepare a minimum of three concentrations. Place each bag on a smooth surface, and alternately depress opposite sides of the bag 50 times to mix the gases. Record the average meter temperature and pressure, the gas volume and the barometric pressure. Record the syringe temperature and pressure before injection.

Calculate each organic standard concentration C_s in ppm as follows:

$$C_s = \frac{G_v \times 10^6 \frac{293}{T_s} \frac{P_s}{760}}{V_m Y \frac{293}{T_m} \frac{P_m}{760} 1000} = \frac{G_v \times 10^3 \frac{P_s}{T_s} \frac{T_m}{P_m}}{V_m Y} \quad \text{Eq. 18-3}$$

procedures.

6.2.1 Preparation of Standards from High Concentration Cylinder Standards. Obtain enough high concentration cylinder standards to represent all the organic compounds expected in the source samples.

Use these high concentration standards to prepare lower concentration standards by dilution, as shown by Figures 18-5 and 18-6.

To prepare the diluted calibration samples, calibrated rotameters are normally used to meter both the high concentration calibration gas and the diluent gas. Other types of flowmeters and commercially available dilution systems can also be used.

Calibrate each flowmeter before use by placing it between the diluent gas supply and suitably sized bubble meter, spirometer, or wet test meter. Record all data shown on Figure 18-4. While it is desirable to calibrate the cylinder gas flowmeter with cylinder gas, the available quantity and cost may preclude it. The error introduced by using the diluent gas for calibration is insignificant for gas mixtures of up to 1,000 to 2,000 ppm of each organic component.

Once the flowmeters are calibrated, connect the flowmeters to the calibration and diluent gas supplies using 6-mm Teflon tubing. Connect the outlet side of the flowmeters through a connector to a leak-free Tedlar bag as shown in Figure 18-5. (See Section 7.1 for bag leak-check procedures.) Adjust the gas flow to provide the desired dilution, and fill the bag with sufficient gas for GC calibration. Be careful not to overfill and cause the bag to apply additional pressure on the dilution system. Record the flow rates of both flowmeters, and the laboratory temperature and atmospheric pressure. Calculate the concentration C_s in ppm of each organic in the diluted gas as follows:

$$C_s = \frac{10^6 (\bar{X} q_c)}{q_c + q_d} \quad \text{Eq. 18-1}$$

where:

10^6 = Conversion to ppm.

X = Mole or volume fraction of the organic in the calibration gas to be diluted.

q_c = Flow rate of the calibration gas to be diluted.

q_d = Diluent gas flow rate.

Single-stage dilutions should be used to prepare calibration mixtures up to about 1:20 dilution factor.

For greater dilutions, a double dilution system is recommended, as shown in Figure 18-6. Fill the Tedlar bag with the dilute gas from the second stage. Record the laboratory temperature, barometric pressure, and static pressure readings. Correct the flow reading for temperature and pressure. Calculate the concentration C_s in ppm of the organic in the final gas mixture as follows:

analytical procedures.

6.1.2 Preliminary GC Adjustment. Using the standards and column obtained in Section 6.1.1, perform initial tests to determine appropriate GC conditions that provide good resolution and minimum analysis time for the compounds of interest.

6.1.3 Preparation of Presurvey Samples. If the samples were collected on an adsorbent, extract the sample as recommended by the manufacturer for removal of the compounds with a solvent suitable to the type of GC analysis. Prepare other samples in an appropriate manner.

6.1.4 Presurvey Sample Analysis. Before analysis, heat the presurvey sample to the duct temperature to vaporize any condensed material. Analyze the samples by the GC procedure, and compare the retention times against those of the calibration samples that contain the components expected to be in the stream. If any compounds cannot be identified with certainty by this procedure, identify them by other means such as GC/mass spectroscopy (GC/MS) or GC/infrared techniques. A GC/MS system is recommended.

Use the GC conditions determined by the procedure of Section 6.1.2 for the first injection. Vary the GC parameters during subsequent injections to determine the optimum settings. Once the optimum settings have been determined, perform repeat injections of the sample to determine the retention time of each compound. To inject a sample, draw sample through the loop at a constant rate (100 ml/min for 30 seconds). Be careful not to pressurize the gas in the loop. Turn off the pump and allow the gas in the sample loop to come to ambient pressure. Activate the sample valve, and record injection time, loop temperature, column temperature, carrier flow rate, chart speed, and attenuator setting. Calculate the retention time of each peak using the distance from injection to the peak maximum divided by the chart speed. Retention times should be repeatable within 0.5 seconds.

If the concentrations are too high for appropriate detector response, a smaller sample loop or dilutions may be used for gas samples, and, for liquid samples, dilution with solvent is appropriate. Use the standard curves (Section 6.3) to obtain an estimate of the concentrations.

Identify all peaks by comparing the known retention times of compounds expected to be in the retention times of peaks in the sample. Identify any remaining unidentified peaks which have areas larger than 5 percent of the total using a GC/MS, or estimation of possible compounds by their retention times compared to known compounds, with confirmation by further GC analysis.

6.2 Calibration Standards. Prepare or obtain enough calibration standards so that there are three different concentrations of each organic compound expected to be measured in the source sample. For each organic compound, select those concentrations that bracket the concentrations expected in the source samples. A calibration standard may contain more than one organic compound. If available, commercial cylinder gases may be used if their concentrations have been certified by direct analysis.

If samples are collected in adsorbent tubes (charcoal, XAD-2, Tenax, etc.), prepare or obtain standards in the same solvent used for the sample extraction procedure. Refer to Section 7.4.3.

Verify the stability of all standards for the time periods they are used. If gas standards are prepared in the laboratory, use one or more of the following

purged and filled with duct gases, open the stopcock to the grab flask until the pressure in the flask reaches duct pressure. Close off the stopcock, and remove the probe from the duct. Remove the tee from the flask and tape the stopcocks to prevent leaks during shipment. Measure and record the duct temperature and pressure.

5.3.1.2 Purged Flask Procedure. Attach one end of the sampling flask to a rubber suction bulb. Attach the other end to a 6-mm OD glass probe as described in Section 5.3.1.1. Place the filter end of the probe at the centroid of the duct, or at a point no closer to the walls than 1 m, and apply suction with the bulb to completely purge the probe and flask. After the flask has been purged, close off the stopcock near the suction bulb, and then close off the stopcock near the probe. Remove the probe from the duct, and disconnect both the probe and suction bulb. Tape the stopcocks to prevent leakage during shipment. Measure and record the duct temperature and pressure.

5.3.2 Flexible Bag Procedure. Tedlar or aluminized Mylar bags can also be used to obtain the presurvey sample. Use new bags, and leak check them before field use. In addition, check the bag before use for contamination by filling it with nitrogen or air, and analyzing the gas by GC at high sensitivity. Experience indicates that it is desirable to allow the inert gas to remain in the bag about 24 hours or longer to check for desorption of organics from the bag. Follow the leak-check and sample collection procedures given in Section 7.1.

5.3.3 Determination of Moisture Content. For combustion or water-controlled processes, obtain the moisture content from plant personnel or by measurement during the presurvey. If the source is below 59°C, measure the wet bulb and dry bulb temperatures, and calculate the moisture content using a psychrometric chart. At higher temperatures, use Method 4 to determine the moisture content.

5.4 Determination of Static Pressure. Obtain the static pressure from the plant personnel or measurement. If a type S pitot tube and an inclined manometer are used, take care to align the pitot tube 90° from the direction of the flow. Disconnect one of the tubes to the manometer, and read the static pressure; note whether the reading is positive or negative.

5.5 Collection of Presurvey Samples with Adsorption Tube. Follow Section 7.4 for presurvey sampling.

6. ANALYSIS DEVELOPMENT

6.1 Selection of GC Parameters.

6.1.1 Column Choice. Based on the initial contact with plant personnel concerning the plant process and the anticipated emissions, choose a column that provides good resolution and rapid analysis time. The choice of an appropriate column can be aided by a literature search, contact with manufacturers of GC columns, and discussion with personnel at the emission source.

Most column manufacturers keep excellent records on their products. Their technical service departments may be able to recommend appropriate columns and detector type for separating the anticipated compounds, and they may be able to provide information on interferences, optimum operating conditions, and column limitations.

Plants with analytical laboratories may be able to provide information on their

5.2 Reagents.

5.2.1 **Water.** Deionized distilled.

5.2.2 **Methylene Dichloride.**

5.2.3 **Calibration Gases.** A series of standards prepared for every compound of interest.

5.2.4 **Organic Compound Solutions.** Pure (99.9 percent), or as pure as can reasonably be obtained, liquid samples of all the organic compounds needed to prepare calibration standards.

5.2.5 **Extraction Solvents.** For extraction of adsorbent tube samples in preparation for analysis.

5.2.6 **Fuel.** As recommended by the manufacturer for operation of the GC.

5.2.7 **Carrier Gas.** Hydrocarbon free, as recommended by the manufacturer for operation of the detector and compatibility with the column.

5.2.8 **Zero Gas.** Hydrocarbon free air or nitrogen, to be used for dilutions, blank preparation, and standard preparation.

5.3 Sampling.

5.3.1 **Collection of Samples with Glass Sampling Flasks.** Presurvey samples can be collected in precleaned 250-ml double-ended glass sampling flasks. Teflon stopcocks, without grease, are preferred. Flasks should be cleaned as follows: Remove the stopcocks from both ends of the flasks, and wipe the parts to remove any grease. Clean the stopcocks, barrels, and receivers with methylene dichloride. Clean all glass ports with a soap solution, then rinse with tap and deionized distilled water. Place the flask in a cool glass annealing furnace, and apply heat up to 500°C. Maintain at this temperature for 1 hour. After this time period, shut off and open the furnace to allow the flask to cool. Grease the stopcocks with stopcock grease, and return them to the flask receivers. Purge the assembly with high-purity nitrogen for 2 to 5 minutes. Close off the stopcocks after purging to maintain a slight positive nitrogen pressure. Secure the stopcocks with tape.

Presurvey samples can be obtained either by drawing the gases into the previously evacuated flask or by drawing the gases into and purging the flask with a rubber suction bulb.

5.3.1.1 **Evacuated Flask Procedure.** Use a high-vacuum pump to evacuate the flask to the capacity of the pump; then close off the stopcock leading to the pump. Attach a 6-mm outside diameter (OD) glass tee to the flask inlet with a short piece of Teflon tubing. Select a 6-mm OD borosilicate sampling probe, enlarged at one end to a 12-mm OD and of sufficient length to reach the centroid of the duct to be sampled. Insert a glass wool plug in the enlarged end of the probe to remove particulate matter. Attach the other end of the probe to the tee with a short piece of Teflon tubing. Connect a rubber suction bulb to the third leg of the tee. Place the filter end of the probe at the centroid of the duct, and purge the probe with the rubber suction bulb. After the probe is completely

constitute endorsement by the U.S. Environmental Protection Agency.) Diameter and length determined by connection requirements of cylinder regulators and the GC. Additional tubing is necessary to connect the GC sample loop to the sample.

5.1.2 Gas Chromatograph. GC with suitable detector, columns, temperature-controlled sample loop and valve assembly, and temperature programmable oven, if necessary. The GC shall achieve sensitivity requirements for the compounds under study.

5.1.3 Pump. Capable of pumping 100 ml/min. For flushing sample loop.

5.1.4 Flow Meter. To measure flow rates.

5.1.5 Regulators. Used on gas cylinders for GC and for cylinder standards.

5.1.6 Recorder. Recorder with linear strip chart is minimum acceptable. Integrator (optional) is recommended.

5.1.7 Syringes. 0.5-ml, 1.0- and 10-microliter size, calibrated, maximum accuracy (gas tight) for preparing calibration standards. Other appropriate sizes can be used.

5.1.8 Tubing Fittings. To plumb GC and gas cylinders.

5.1.9 Septums. For syringe injections.

5.1.10 Glass Jars. If necessary, clean, colored glass jars with Teflon-lined lids for condensate sample collection. Size depends on volume of condensate.

5.1.11 Soap Film Flowmeter. To determine flow rates.

5.1.12 Tedlar Bags. 10- and 50-liter capacity, for preparation of standards.

5.1.13 Dry Gas Meter with Temperature and Pressure Gauges. Accurate to ± 2 percent, for preparation of gas standards.

5.1.14 Midget Impinger/Hot Plate Assembly. For preparation of gas standards.

5.1.15 Sample Flasks. For presurvey samples, must have gas-tight seals.

5.1.16 Adsorption Tubes. If necessary, blank tubes filled with necessary adsorbent (charcoal, Tenax, XAD-2, etc.) for presurvey samples.

5.1.17 Personnel Sampling Pump. Calibrated, for collecting adsorbent tube presurvey samples.

5.1.18 Dilution System. Calibrated, the dilution system is to be constructed following the specifications of an acceptable method.

5.1.19 Sample Probes. Pyrex or stainless steel, of sufficient length to reach centroid of stack, or a point no closer to the walls than 1 m.

5.1.20 Barometer. To measure barometric pressure.

2.2 Sensitivity. The sensitivity limit for a compound is defined as the minimum detectable concentration of that compound, or the concentration that produces a signal-to-noise ratio of three to one. The minimum detectable concentration is determined during the presurvey calibration for each compound.

3. PRECISION AND ACCURACY

Gas chromatographic techniques typically provide a precision of 5 to 10 percent relative standard deviation (RSD), but an experienced GC operator with a reliable instrument can readily achieve 5 percent RSD. For this method, the following combined GC/operator values are required.

(a) Precision. Duplicate analyses are within 5 percent of their mean value.

(b) Accuracy. Analysis results of prepared audit samples are within 10 percent of preparation values.

(c) Recovery. After developing an appropriate sampling and analytical system for the pollutants of interest, conduct the procedure in Section 7.6. Conduct the appropriate recovery study in Section 7.6 at each sampling point where the method is being applied. Submit the data and results of the recovery procedure with the reporting of results under Section 7.5.

4. INTERFERENCES

4.1 Resolution interferences that may occur can be eliminated by appropriate GC column and detector choice or by shifting the retention times through changes in the column flow rate and the use of temperature programming.

4.2 The analytical system is demonstrated to be essentially free from contaminants by periodically analyzing blanks that consist of hydrocarbon-free air or nitrogen.

4.3 Sample cross-contamination that occurs when high-level and low-level samples or standards are analyzed alternately, is best dealt with by thorough purging of the GC sample loop between samples.

4.4 To assure consistent detector response, calibration gases are contained in dry air. To adjust gaseous organic concentrations when water vapor is present in the sample, water vapor concentrations are determined for those samples, and a correction factor is applied.

5. PRESURVEY AND PRESURVEY SAMPLING

Perform a presurvey for each source to be tested. Refer to Figure 18-1. Some of the information can be collected from literature surveys and source personnel. Collect gas samples that can be analyzed to confirm the identities and approximate concentrations of the organic emissions.

5.1 Apparatus. This apparatus list also applies to Sections 6 and 7.

5.1.1 Teflon Tubing. (Mention of trade names or specific products does not

EMISSION MEASUREMENT TECHNICAL INFORMATION CENTER
NSPS TEST METHOD

Method 18 - Measurement of Gaseous Organic Compound
Emissions by Gas Chromatography

INTRODUCTION

This method should not be attempted by persons unfamiliar with the performance characteristics of gas chromatography, nor by those persons who are unfamiliar with source sampling. Particular care should be exercised in the area of safety concerning choice of equipment and operation in potentially explosive atmospheres.

1. APPLICABILITY AND PRINCIPLE

1.1 Applicability.

1.1.1 This method applies to the analysis of approximately 90 percent of the total gaseous organics emitted from an industrial source. It does not include techniques to identify and measure trace amounts of organic compounds, such as those found in building air and fugitive emission sources.

1.1.2 This method will not determine compounds that (1) are polymeric (high molecular weight), (2) can polymerize before analysis, or (3) have very low vapor pressures at stack or instrument conditions.

1.2 **Principle.** The major organic components of a gas mixture are separated by gas chromatography (GC) and individually quantified by flame ionization, photoionization, electron capture, or other appropriate detection principles.

The retention times of each separated component are compared with those of known compounds under identical conditions. Therefore, the analyst confirms the identity and approximate concentrations of the organic emission components beforehand. With this information, the analyst then prepares or purchases commercially available standard mixtures to calibrate the GC under conditions identical to those of the samples. The analyst also determines the need for sample dilution to avoid detector saturation, gas stream filtration to eliminate particulate matter, and prevention of moisture condensation.

2. RANGE AND SENSITIVITY

2.1 **Range.** The lower range of this method is determined by the sampling system; adsorbents may be used to concentrate the sample, thus lowering the limit of detection below the 1 part per million (ppm) typically achievable with direct interface or bag sampling. The upper limit is governed by GC detector saturation or column overloading; the upper range can be extended by dilution of sample with an inert gas or by using smaller volume gas sampling loops. The upper limit can also be governed by condensation of higher boiling compounds.

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2. Field Analysis Data - Calibration Gas

Run No. _____ Time _____

| Components | Area | Attenuation | A_x_A_Factor | Conc._(ppm) |
|------------|-------|-------------|--------------|-------------|
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |

Run No. _____ Time _____

| Components | Area | Attenuation | A_x_A_Factor | Conc._(ppm) |
|------------|-------|-------------|--------------|-------------|
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |

Run No. _____ Time _____

| Components | Area | Attenuation | A_x_A_Factor | Conc._(ppm) |
|------------|-------|-------------|--------------|-------------|
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |

Figure 18-11 (continued). Field analysis data sheets.

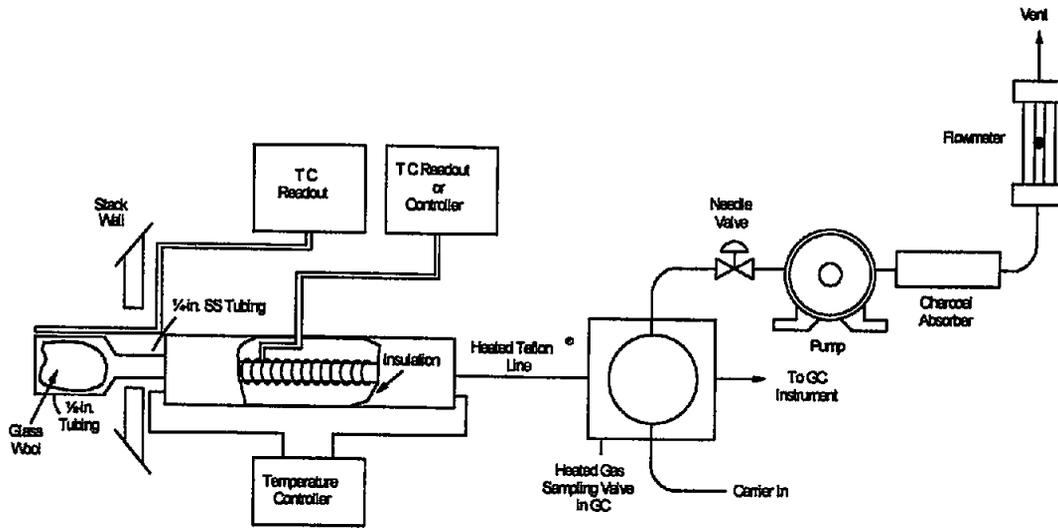


Figure 18-12. Direct Interface Sampling System.

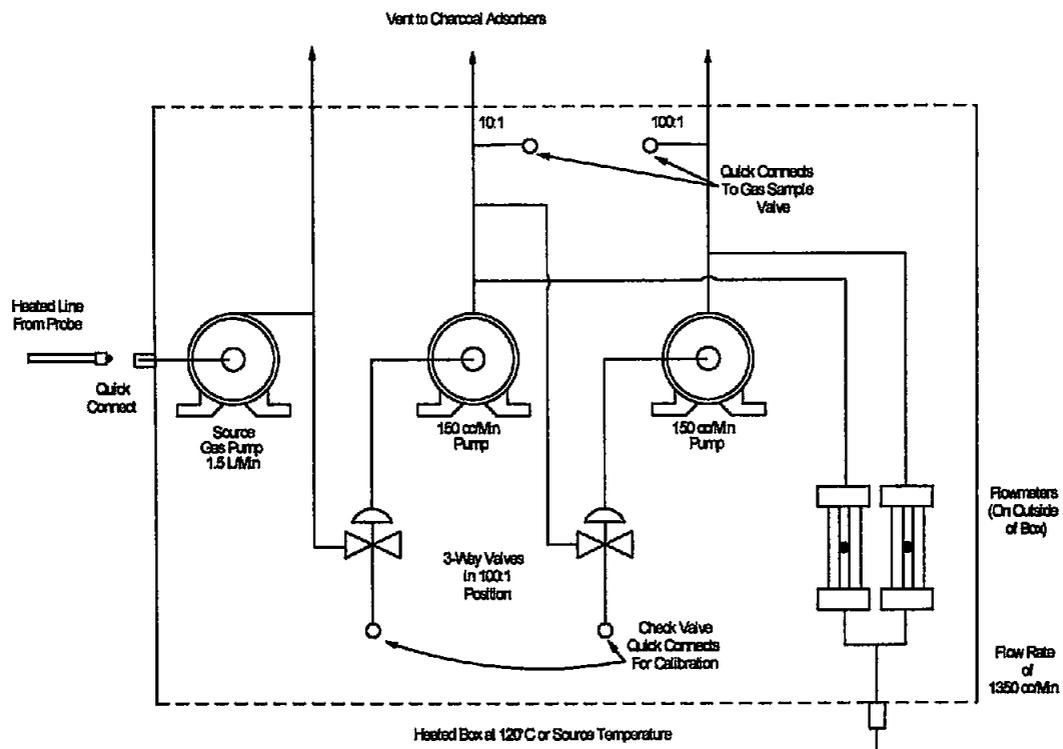


Figure 18-13. Schematic Diagram of the Heated Box Required for Dilution of Sample Gas.

Gaseous Organic Sampling and Analysis Check List
(Respond with initials or number as appropriate)

- | | Date |
|--|--------------------------------|
| 1. Presurvey data | _____ |
| A. Grab sample collected | <input type="checkbox"/> _____ |
| B. Grab sample analyzed for composition | <input type="checkbox"/> _____ |
| Method GC | <input type="checkbox"/> _____ |
| GC/MS | <input type="checkbox"/> _____ |
| Other _____ | <input type="checkbox"/> _____ |
| C. GC-FID analysis performed | <input type="checkbox"/> _____ |
| 2. Laboratory calibration data | _____ |
| A. Calibration curves prepared | <input type="checkbox"/> _____ |
| Number of components | <input type="checkbox"/> _____ |
| Number of concentrations/ component (3 required) | <input type="checkbox"/> _____ |
| B. Audit samples (optional) | _____ |
| Analysis completed | <input type="checkbox"/> _____ |
| Verified for concentration | <input type="checkbox"/> _____ |
| OK obtained for field work | <input type="checkbox"/> _____ |
| 3. Sampling procedures | _____ |
| A. Method | _____ |
| Bag sample | <input type="checkbox"/> _____ |
| Direct interface | <input type="checkbox"/> _____ |
| Dilution interface | <input type="checkbox"/> _____ |
| B. Number of samples collected | <input type="checkbox"/> _____ |
| 4. Field Analysis | _____ |
| A. Total hydrocarbon analysis performed | <input type="checkbox"/> _____ |
| B. Calibration curve prepared | <input type="checkbox"/> _____ |
| Number of components | <input type="checkbox"/> _____ |
| Number of concentrations per component (3 required) | <input type="checkbox"/> _____ |

Gaseous Organic Sampling and Analysis Data

APÉNDICE A MÉTODO 21 DEL 40 CRF PARTE 60

Plant _____ Date _____

Location _____

| | Source sample_1 | Source sample_2 | Source sample_3 |
|--------------------------------------|--------------------|--------------------|--------------------|
| 1. General information | | | |
| Source temperature (°C) | _____ | _____ | _____ |
| Probe temperature (°C) | _____ | _____ | _____ |
| Ambient temperature (°C) | _____ | _____ | _____ |
| Atmospheric pressure (mm Hg) | _____ | _____ | _____ |
| Source pressure (mm Hg) | _____ | _____ | _____ |
| Sampling rate (ml/min) | _____ | _____ | _____ |
| Sample loop volume (ml) | _____ | _____ | _____ |
| Sample loop temperature (°C) | _____ | _____ | _____ |
| Sample collection time (24-hr basis) | _____ | _____ | _____ |
| Column temperature | | | |
| Initial (°C) | _____ | _____ | _____ |
| Program rate (°C/min) | _____ | _____ | _____ |
| Final (°C) | _____ | _____ | _____ |
| Carrier gas flow rate (ml/min) | _____ | _____ | _____ |
| Detector temperature (°C) | _____ | _____ | _____ |
| Chart speed (cm/min) | _____ | _____ | _____ |
| Dilution gas flow rate (ml/min) | _____ | _____ | _____ |
| Diluent gas used (symbol) | _____ | _____ | _____ |
| Dilution ratio | _____ | _____ | _____ |

Performed by (signature): _____

Date: _____

Figure 18-14. Sampling and analysis sheet.

**EMISSION MEASUREMENT TECHNICAL INFORMATION CENTER
NSPS TEST METHOD**

(EMTIC M-21, 2/9/93)

Method 21 - Determination of Volatile Organic Compound Leaks

1. APPLICABILITY AND PRINCIPLE

1.1 Applicability. This method applies to the determination of volatile organic compound (VOC) leaks from process equipment. These sources include, but are not limited to, valves, flanges and other connections, pumps and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, agitator seals, and access door seals.

1.2 Principle. A portable instrument is used to detect VOC leaks from individual sources. The instrument detector type is not specified, but it must meet the specifications and performance criteria contained in Section 3. A leak definition concentration based on a reference compound is specified in each applicable regulation. This procedure is intended to locate and classify leaks only, and is not to be used as a direct measure of mass emission rate from individual sources.

2. DEFINITIONS

2.1 Leak Definition Concentration. The local VOC concentration at the surface of a leak source that indicates that a VOC emission (leak) is present. The leak definition is an instrument meter reading based on a reference compound.

2.2 Reference Compound. The VOC species selected as an instrument calibration basis for specification of the leak definition concentration. (For example, if a leak definition concentration is 10,000 ppm as methane, then any source emission that results in a local concentration that yields a meter reading of 10,000 on an instrument meter calibrated with methane would be classified as a leak. In this example, the leak definition is 10,000 ppm, and the reference compound is methane.)

2.3 Calibration Gas. The VOC compound used to adjust the instrument meter reading to a known value. The calibration gas is usually the reference compound at a known concentration approximately equal to the leak definition concentration.

2.4 No Detectable Emission. The total VOC concentration at the

surface of a leak source that indicates that a VOC emission (leak) is not present. Since background VOC concentrations may exist, and to account for instrument drift and imperfect reproducibility, a

difference between the source surface concentration and the local ambient concentration is determined. A difference based on the meter readings of less than a concentration corresponding to the minimum readability specification indicates that a VOC emission (leak) is not present. (For example, if the leak definition in a regulation is 10,000 ppm, then the allowable increase is surface concentration versus local ambient concentration would be 500 ppm based on the instrument meter readings.)

2.5 Response Factor. The ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation.

2.6 Calibration Precision. The degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

2.7 Response Time. The time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

3. APPARATUS

3.1 Monitoring Instrument.

3.1.1 Specifications

a. The VOC instrument detector shall respond to the compounds being processed. Detector types which may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

b. The instrument shall be capable of measuring the leak definition concentration specified in the regulation.

c. The scale of the instrument meter shall be readable to + or - 5 percent of the specified leak definition concentration.

d. The instrument shall be equipped with a pump so that a continuous sample is provided to the detector. The nominal sample flow rate shall be 0.1 to 3.0 liters per minute.

e. The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the applicable U.S.A. standards (e.g., National Electrical Code by the National Fire Prevention Association).

f. The instrument shall be equipped with a probe or probe extension for sampling not to exceed 1/4 in. in outside diameter, with a single end opening for admission of sample.

3.1.2 Performance Criteria.

a. The instrument response factors for the individual compounds to be measured must be less than 10.

b. The instrument response time must be equal to or less than 30 seconds. The response time must be determined for the instrument configuration to be used during testing.

c. The calibration precision must be equal to or less than 10 percent of the calibration gas value.

d. The evaluation procedure for each parameter is given in Section 4.4.

3.1.3 Performance Evaluation Requirements.

a. A response factor must be determined for each compound that is to be measured, either by testing or from reference sources. The response factor tests are required before placing the analyzer into service, but do not have to be repeated at subsequent intervals.

b. The calibration precision test must be completed prior to placing the analyzer into service, and at subsequent 3-month intervals or at the next use whichever is later.

c. The response time test is required before placing the instrument into service. If a modification to the sample pumping system or flow configuration is made that would change the response time, a new test is required before further use.

3.2 Calibration Gases.

The monitoring instrument is calibrated in terms of parts per million by volume (ppm) of the reference compound specified in the applicable regulation. The calibration gases required for monitoring and instrument performance evaluation are a zero gas (air, less than 10 ppm VOC) and a calibration gas in air mixture approximately equal to the leak definition specified in the regulation. If cylinder calibration gas mixtures are used, they

must be analyzed and certified by the manufacturer to be within + or - 2 percent accuracy, and a shelf life must be specified. Cylinder standards must be either reanalyzed or replaced at the end of the specified shelf life. Alternatively, calibration gases may be prepared by the user according to any accepted gaseous preparation procedure that will yield a mixture accurate to within + or - 2 percent. Prepared standards must be replaced each day of use unless it can be demonstrated that degradation does not occur during storage.

Calibrations may be performed using a compound other than the reference compound if a conversion factor is determined for that alternative compound so that the resulting meter readings during source surveys can be converted to reference compound results.

4. PROCEDURES

4.1 Pretest Preparations. Perform the instrument evaluation procedure given in Section 4.4 if the evaluation requirement of Section 3.1.3 have not been met.

4.2 Calibration Procedures. Assemble and start up the VOC analyzer according to the manufacturer's instructions. After the appropriate warmup period and zero internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value. (Note: If the meter readout cannot be adjusted to the proper value, a malfunction of the analyzer is indicated and corrective actions are necessary before use.)

4.3 Individual Source Surveys.

4.3.1 Type I - Leak Definition Based on Concentration. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation, record and report the results as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are:

a. Valves - Leaks usually occur at the seal between the stem and the housing. Place the probe at the interface where the stem exits the packing and sample the stem circumference and the flange periphery. Survey valves of multipart assemblies where a leak could occur.

b. Flanges and Other Connections - Place the probe at the outer edge of the flange-gasket interface and sample the circumference of the flange.

c. Pump or Compressor Seals - If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described above.

d. Pressure Relief Devices - For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere.

e. Process Drains - For open drains, place the probe inlet as near as possible to the center of the area open to the atmosphere. For covered drains, locate probe at the surface of the cover and traverse the periphery.

f. Open-ended Lines or Valves - Place the probe inlet at approximately the center of the opening of the atmosphere.

g. Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices - If applicable, observe whether the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur before the control device. If the required ducting or piping exists and there are no sources where the emissions could be vented to the atmosphere before the control device, then it is presumed that no detectable emissions are present. If there are sources in the ducting or piping where emissions could be vented or sources where leaks could occur, the sampling surveys described in this section shall be used to determine if detectable emissions exist.

h. Access door seals - Place the probe inlet at the surface of the door seal interface and traverse the periphery.

4.3.2 Type II - "No Detectable Emission". Determine the ambient concentration around the source by moving the probe randomly upwind and downwind around one to two meters from the source. In case of interferences, this determination may be made closer to the source down to no closer than 25 centimeters. Then move the probe to the surface of the source and measure as in 4.3.1. The difference in these concentrations determines whether there are no detectable emissions. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are: (a) Pump or Compressor Seals - Survey the local area ambient VOC concentration and determine if detectable emissions exist. (b) Seal System Degassing

Vents, Accumulator Vessel Vents, Pressure Relief Devices - Determine if any VOC sources exist upstream of the device. If such ducting exists and emissions cannot be vented to the atmosphere upstream of the control device, then it is presumed that no detectable emissions are present. If venting is possible sample to determine if detectable emissions are present.

4.3.3 Alternative Screening Procedure.

4.3.3.1 A screening procedure based on the formation of bubbles in a soap solution that is sprayed on a potential leak source may be used for those sources that do not have continuously moving parts, that do not have surface temperatures greater than the boiling point or less than the freezing point of the soap solution, that do not have open areas to the atmosphere that the soap solution cannot bridge, or that do not exhibit evidence of liquid leakage. Sources that have these conditions present must be surveyed using the instrument technique of Section 4.3.1 or 4.3.2.

4.3.3.2 Spray a soap solution over all potential leak sources. The soap Solution may be a commercially available leak detection solution or may be prepared using concentrated detergent and water.

A pressure sprayer or squeeze bottle may be used to dispense the solution. Observe the potential leak sites to determine if any bubbles are formed. If no bubbles are observed, the source is presumed to have no detectable emissions or leaks as applicable. If any bubbles are observed, the instrument techniques of Section 4.3.1 or 4.3.2 shall be used to determine if a leak exists, or if the source has detectable emissions, as applicable.

4.4 Instrument Evaluation Procedures. At the beginning of the instrument performance evaluation test, assemble and start up the instrument according to the manufacturer's instructions for recommended warmup period and preliminary adjustments.

4.4.1 Response Factor.

4.4.1.1 Calibrate the instrument with the reference compound as specified in the applicable regulation. For each organic species that is to be measured during individual source surveys, obtain or prepare a known standard in air at a concentration of approximately 80 percent of the applicable leak definition unless limited by volatility or explosivity. In these cases, prepare a standard at 90 percent of the standard saturation concentration, or 70 percent of the lower explosive limit, respectively. Introduce this mixture to the analyzer and record the observed meter reading. Introduce zero air until a stable reading is obtained. Make a total of three

measurements by alternating between the known mixture and zero air. Calculate the response factor for each repetition and the average response factor.

4.4.1.2 Alternatively, if response factors have been published for the compounds of interest for the instrument or detector type, the response factor determination is not required, and existing results may be referenced. Examples of published response factors for flame ionization and catalytic oxidation detectors are included in the Bibliography.

4.4.2 Calibration Precision. Make a total of three measurements by alternately using zero gas and the specified calibration gas. Record the meter readings. Calculate the average algebraic difference between the meter readings and the known value. Divide this average difference by the known calibration value and multiply by 100 to express the resulting calibration precision as a percentage.

4.4.3 Response Time. Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. Measure the time from switching to when 90 percent of the final stable reading is attained. Perform this test sequence three times and record the results. Calculate the average response time.

5. BIBLIOGRAPHY

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APÉNDICE A MÉTODO 25 DEL 40 CRF PARTE 60

EMISSION MEASUREMENT TECHNICAL INFORMATION CENTER
NSPS TEST METHOD

(EMTIC M-25, 6/18/93)

Method 25 - Determination of Total Gaseous Nonmethane
Organic Emissions as Carbon

1. APPLICABILITY AND PRINCIPLE

1.1 Applicability.

1.1.1 This method applies to the measurement of volatile organic compounds (VOC) as total gaseous nonmethane organics (TGNMO) as carbon in source emissions. Organic particulate matter will interfere with the analysis and, therefore, a particulate filter is required.

1.1.2 When carbon dioxide (CO₂) and water vapor are present together in the stack, they can produce a positive bias in the sample. The magnitude of the bias depends on the concentrations of CO₂ and water vapor. As a guideline, multiply the CO₂ concentration, expressed as volume percent, times the water vapor concentration. If this product does not exceed 100, the bias can be considered insignificant. For example, the bias is not significant for a source having 10 percent CO₂ and 10 percent water vapor, but it might be significant for a source having 10 percent CO₂ and 20 percent water vapor.

1.1.3 This method is not the only method that applies to the measurement of TGNMO. Costs, logistics, and other practicalities of source testing may make other test methods more desirable for measuring VOC contents of certain effluent streams. Proper judgment is required in determining the most applicable VOC test method. For example, depending upon the molecular weight of the organics in the effluent stream, a totally automated semicontinuous nonmethane organics (NMO) analyzer interfaced directly to the source may yield accurate results. This approach has the advantage of providing emission data semicontinuously over an extended time period.

1.1.4 Direct measurement of an effluent with a flame ionization detector (FID) analyzer may be appropriate with prior characterization of the gas stream and knowledge that the detector responds predictably to the organic compounds in the stream. If present, methane (CH₄) will, of course, also be measured. The FID can be applied to the determination of the mass concentration of the total molecular structure of the organic emissions under any of the following limited conditions: (1) where only one compound is known to exist; (2) when the organic compounds consist of only hydrogen and carbon; (3) where the relative percentages of the compounds are known or can be determined, and the FID responses to the compounds are known; (4) where a consistent mixture of the compounds exists before and after emission control and only the relative concentrations are to be assessed; or (5) where the FID can be calibrated against mass standards of the compounds emitted (solvent emissions, for example).

1.1.5 Another example of the use of a direct FID is as a screening method. If there is enough information available to provide a rough estimate of the analyzer accuracy, the FID analyzer can be used to determine the VOC content of an uncharacterized gas stream. With a sufficient buffer to account for possible inaccuracies, the direct FID can be a useful tool to obtain the desired results without costly exact determination.

1.1.6 In situations where a qualitative/quantitative analysis of an effluent stream is desired or required, a gas chromatographic FID system may apply. However, for sources emitting numerous organics, the time and expense of this approach will be formidable.

1.2 **Principle.** An emission sample is withdrawn from the stack at a constant rate through a heated filter and a chilled condensate trap by means of an evacuated sample tank. After sampling is completed, the TGNMO are determined by independently analyzing the condensate trap and sample tank fractions and combining the analytical results. The organic content of the condensate trap fraction is determined by oxidizing the NMO to CO₂ and quantitatively collecting in the effluent in an evacuated vessel; then a portion of the CO₂ is reduced to CH₄ and measured by an FID. The organic content of the sample tank fraction is measured by injecting a portion of the sample into a gas chromatographic column to separate the NMO from carbon monoxide (CO), CO₂, and CH₄; the NMO are oxidized to CO₂, reduced to CH₄, and measured by an FID. In this manner, the variable response of the FID associated with different types of organics is eliminated.

2. APPARATUS

2.1 **Sampling.** The sampling system consists of a heated probe, heated filter, condensate trap, flow control system, and sample tank (Figure 25-1). The TGNMO sampling equipment can be constructed from commercially available components and components fabricated in a machine shop. The following equipment is required:

2.1.1 **Heated Probe.** 6.4-mm (1/4-in.) OD stainless steel tubing with a heating system capable of maintaining a gas temperature at the exit end of at least 129°C (265°F). The probe shall be equipped with a thermocouple at the exit end to monitor the gas temperature.

2.1.1.1 A suitable probe is shown in Figure 25-1. The nozzle is an elbow fitting attached to the front end of the probe while the thermocouple is inserted in the side arm of a tee fitting attached to the rear of the probe. The probe is wrapped with a suitable length of high temperature heating tape, and then covered with two layers of glass cloth insulation and one layer of aluminum foil.

2.1.1.2 **Note:** If it is not possible to use a heating system for safety reasons, an unheated system with an in-stack filter is a suitable alternative.

2.1.2 **Filter Holder.** 25-mm (15/16-in.) ID Gelman filter holder with 303 stainless steel body and 316 stainless steel support screen with the Viton O-ring replaced by a Teflon O-ring. (**Note:** Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.)

2.1.3 **Filter Heating System.** A metal box consisting of an inner and an outer shell separated by insulating material with a heating element in the inner shell capable of maintaining a gas temperature at the filter of 121 ± 3°C (250 ± 5°F).

2.1.3.1 A suitable heating box is shown in Figure 25-2. The outer shell is a metal box that measures 102 mm x 280 mm x 292 mm (4 in. x 11 in. x 11 1/2 in.), while the inner shell is a metal box measuring 76 mm x 229 mm x 241 mm (3 in. x 9 in. x 9 1/2 in.). The inner box is supported by 13-mm (1/2-in.) phenolic rods. The void space between the boxes is filled with fiberfrax insulation which is sealed in place by means of a silicon rubber bead around the upper sides of the box. A removable lid made in a similar manner, with a 25-mm (1-in.) gap between the parts is used to cover the heating chamber.

2.1.3.2 The inner box is heated with a 250-watt cartridge heater, shielded by a stainless steel shroud. The heater is regulated by a thermostatic temperature controller which is set to maintain a temperature of 121°C as measured by a thermocouple in the gas line just before the filter. An additional thermocouple is used to monitor the temperature of the gas behind the filter.

2.1.3.3 Note: If it is not possible to use a heating system for safety reasons, an unheated system with an in-stack filter is a suitable alternative.

2.1.4 Condensate Trap. 9.5-mm (3/8-in.) OD 316 stainless steel tubing bent into a U-shape. Exact dimensions are shown in Figure 25-3. The tubing shall be packed with coarse quartz wool, to a density of approximately 0.11 g/cc before bending. While the condensate trap is packed with dry ice in the Dewar, an ice bridge may form between the arms of the condensate trap making it difficult to remove the condensate trap. This problem can be prevented by attaching a steel plate between the arms of the condensate trap in the same plane as the arms to completely fill the intervening space.

2.1.5 Valve. Stainless steel control valve for starting and stopping sample flow.

2.1.6 Metering Valve. Stainless steel valve for regulating the sample flow rate through the sample train.

2.1.7 Rotameter. Glass tube with stainless steel fittings, capable of measuring sample flow in the range of 60 to 100 cc/min.

2.1.8 Sample Tank. Stainless steel or aluminum tank with a minimum volume of 4 liters.

2.1.9 Mercury Manometer. U-tube manometer or absolute pressure gauge capable of measuring pressure to within 1 mm Hg in the range of 0 to 900 mm.

2.1.10 Vacuum Pump. Capable of evacuating to an absolute pressure of 10 mm Hg.

2.2 Condensate Recovery Apparatus. The system for the recovery of the organics captured in the condensate trap consists of a heat source, oxidation catalyst, nondispersive infrared (NDIR) analyzer and an intermediate collection vessel (ICV). Figure 25-4 is a schematic of a typical system. The system shall be capable of proper oxidation and recovery, as specified in Section 5.1. The following major components are required:

2.2.1. Heat Source. Sufficient to heat the condensate trap (including probe) to a temperature of 200°C. A system using both a heat gun and an electric tube furnace is recommended.

2.2.2 Heat Tape. Sufficient to heat the connecting tubing between the water trap and the oxidation catalyst to 100°C.

2.2.3 Oxidation Catalyst. A suitable length of 9.5 mm (3/8-in.) OD Inconel 600 tubing packed with 15 cm (6 in.) of 3.2 mm (1/8 in.) diameter 19 percent chromia on alumina pellets. The catalyst material is packed in the center of the catalyst tube with quartz wool packed on either end to hold it in place. The catalyst tube shall be mounted vertically in a 650°C tube furnace.

2.2.4 Water Trap. Leak proof, capable of removing moisture from the gas stream.

2.2.5 Syringe Port. A 6.4-mm (1/4-in.) OD stainless steel tee fitting with a

rubber septum placed in the side arm.

2.2.6 NDIR Detector. Capable of indicating CO₂ concentration in the range of zero to 5 percent, to monitor the progress of combustion of the organic compounds from the condensate trap.

2.2.7 Flow-Control Valve. Stainless steel, to maintain the trap conditioning system near atmospheric pressure.

2.2.8 Intermediate Collection Vessel. Stainless steel or aluminum, equipped with a female quick connect. Tanks with nominal volumes of at least 6 liters are recommended.

2.2.9 Mercury Manometer or Absolute Pressure Gauge. Capable of measuring pressure to within 1 mm Hg in the range of 0 to 900 mm.

2.2.10 Syringe. 10-ml gas-tight glass syringe equipped with an appropriate needle.

2.3 NMO Analyzer. The NMO analyzer is a gas chromatograph (GC) with backflush capability for NMO analysis and is equipped with an oxidation catalyst, reduction catalyst, and FID. Figures 25-5 and 25-6 are schematics of a typical NMO analyzer. This semicontinuous GC/FID analyzer shall be capable of: (1) separating CO, CO₂, and CH₄ from NMO, (2) reducing the CO₂ to CH₄ and quantifying as CH₄, and (3) oxidizing the NMO to CO₂, reducing the CO₂ to CH₄ and quantifying as CH₄, according to Section 5.2. The analyzer consists of the following major components:

2.3.1 Oxidation Catalyst. A suitable length of 9.5-mm (3/8-in.) OD Inconel 600 tubing packed with 5.1 cm (2 in.) of 19 percent chromia on 3.2-mm (1/8-in.) alumina pellets. The catalyst material is packed in the center of the tube supported on either side by quartz wool. The catalyst tube must be mounted vertically in a 650°C furnace.

2.3.2 Reduction Catalyst. A 7.6-cm (3-in.) length of 6.4-mm (1/4-in.) OD Inconel tubing fully packed with 100-mesh pure nickel powder. The catalyst tube must be mounted vertically in a 400°C furnace.

2.3.3 Separation Column(s). A 30-cm (1-ft) length of 3.2-mm (1/8-in.) OD stainless steel tubing packed with 60/80 mesh Unibeads 1S followed by a 61-cm (2-ft) length of 3.2-mm (1/8-in.) OD stainless steel tubing packed with 60/80 mesh Carbosieve G. The Carbosieve and Unibeads columns must be baked separately at 200°C with carrier gas flowing through them for 24 hours before initial use.

2.3.4 Sample Injection System. A 10-port GC sample injection valve fitted with a sample loop properly sized to interface with the NMO analyzer (1-cc loop recommended).

2.3.5 FID. An FID meeting the following specifications is required: 2.3.5.1 Linearity. A linear response (±5 percent) over the operating range as demonstrated by the procedures established in Section 5.2.3.

2.3.5.2 Range. A full scale range of 10 to 50,000 ppm CH₄. Signal attenuators shall be available to produce a minimum signal response of 10 percent of full scale.

2.3.6 Data Recording System. Analog strip chart recorder or digital integration system compatible with the FID for permanently recording the analytical results.

2.4 Other Analysis Apparatus.

2.4.1 **Barometer.** Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 1 mm Hg.

2.4.2 **Thermometer.** Capable of measuring the laboratory temperature within 1°C.

2.4.3 **Vacuum Pump.** Capable of evacuating to an absolute pressure of 10 mm Hg.

2.4.4 **Syringes.** 10- μ l and 50- μ l liquid injection syringes.

2.4.5 **Liquid Sample Injection Unit.** 316 SS U-tube fitted with an injection septum, see Figure 25-7.

3. REAGENTS

3.1 **Sampling.** The following are required for sampling:

3.1.1 **Crushed dry ice.**

3.1.2 **Coarse quartz wool.** 8 to 15 μ m.

3.2 **NMO Analysis.** The following gases are needed:

3.2.1 **Carrier Gases.** Zero grade helium (He) and oxygen (O₂) containing less than 1 ppm CO₂ and less than 0.1 ppm C as hydrocarbon.

3.2.2 **Fuel Gas.** Zero grade hydrogen (H₂), 99.999 percent pure.

3.2.3 **Combustion Gas.** Zero grade air or O₂ as required by the detector. 3.3 **Condensate Analysis.** The following gases are needed:

3.3.1 **Carrier Gas.** Zero grade air, containing less than 1 ppm C. 3.3.2 **Auxiliary O₂.** Zero grade O₂ containing less than 1 ppm C. 3.3.3 **Hexane.** ACS grade, for liquid injection.

3.3.4 **Decane.** ACS grade, for liquid injection.

3.4 **Calibration.** For all calibration gases, the manufacturer must recommend a maximum shelf life for each cylinder (i.e., the length of time the gas concentration is not expected to change more than \pm 5 percent from its certified value). The date of gas cylinder preparation, certified organic concentration, and recommended maximum shelf life must be affixed to each cylinder before shipment from the gas manufacturer to the buyer. The following calibration gases are required:

3.4.1 **Oxidation Catalyst Efficiency Check Calibration Gas.** Gas mixture standard with nominal concentration of 1 percent methane in air.

3.4.2 **FID Linearity and NMO Calibration Gases.** Three gas mixture standards with nominal propane concentrations of 20 ppm, 200 ppm, and 3000 ppm, in air.

3.4.3 **CO₂ Calibration Gases.** Three gas mixture standards with nominal CO₂ concentrations of 50 ppm, 500 ppm, and 1 percent, in air. Note: Total NMO less than 1 ppm required for 1 percent mixture.

3.4.4 **NMO Analyzer System Check Calibration Gases.** Four calibration gases are needed as follows:

3.4.4.1 Propane Mixture. Gas mixture standard containing (nominal) 50 ppm CO, 50 ppm CH₄, 2 percent CO₂, and 20 ppm C₃H₈, prepared in air.

3.4.4.2 Hexane. Gas mixture standard containing (nominal) 50 ppm hexane in air.

3.4.4.3 Toluene. Gas mixture standard containing (nominal) 20 ppm toluene in air.

3.4.4.4 Methanol. Gas mixture standard containing (nominal) 100 ppm methanol in air.

4. PROCEDURE

4.1 Sampling.

4.1.1 Sample Tank Evacuation and Leak Check. Evacuate the sample tank to 10 mm Hg absolute pressure or less. Then close the sample tank valve, and allow the tank to sit for 30 minutes. The tank is acceptable if a change in tank vacuum of less than 2 mm Hg is noted. The evacuation and leak check may be conducted either in the laboratory or the field.

4.1.2 Sample Train Assembly. Just before assembly, measure the tank vacuum using a mercury U-tube manometer. Record this vacuum, the ambient temperature, and the barometric pressure at this time. Close the sample tank valve and assemble the sampling system as shown in Figure 25-1. Immerse the condensate trap body in dry ice. The point where the inlet tube joins the trap body should be 2.5 to 5 cm above the top of the dry ice.

4.1.3 Pretest Leak Check. A pretest leak check is required. Calculate or measure the approximate volume of the sampling train from the probe tip to the sample tank valve. After assembling the sampling train, plug the probe tip, and make certain that the sample tank valve is closed. Turn on the vacuum pump, and evacuate the sampling system from the probe tip to the sample tank valve to an absolute pressure of 10 mm Hg or less. Close the purge valve, turn off the pump, wait a minimum period of 10 minutes, and recheck the indicated vacuum. Calculate the maximum allowable pressure change based on a leak rate of 1 percent of the sampling rate using Equation 25-1, Section 6.2. If the measured pressure change exceeds the calculated limit, correct the problem and repeat the leak check before beginning sampling.

4.1.4 Sample Train Operation.

4.1.4.1 Unplug the probe tip, and place the probe into the stack such that the probe is perpendicular to the duct or stack axis; locate the probe tip at a single preselected point of average velocity facing away from the direction of gas flow. For stacks having a negative static pressure, seal the sample port sufficiently to prevent air in-leakage around the probe. Set the probe temperature controller to 129°C (265°F) and the filter temperature controller to 121°C (250°F). Allow the probe and filter to heat for about 30 minutes before purging the sample train.

4.1.4.2 Close the sample valve, open the purge valve, and start the vacuum pump. Set the flow rate between 60 and 100 cc/min, and purge the train with stack gas for at least 10 minutes. When the temperatures at the exit ends of the probe and filter are within their specified range, sampling may begin.

4.1.4.3 Check the dry ice level around the condensate trap, and add dry ice if

necessary. Record the clock time. To begin sampling, close the purge valve and stop the pump. Open the sample valve and the sample tank valve. Using the flow control valve, set the flow through the sample train to the proper rate. Adjust the flow rate as necessary to maintain a constant rate (± 10 percent) throughout the duration of the sampling period. Record the sample tank vacuum and flowmeter setting at 5-minute intervals. (See Figure 25-8.). Select a total sample time greater than or equal to the minimum sampling time specified in the applicable subpart of the regulation; end the sampling when this time period is reached or when a constant flow rate can no longer be maintained because of reduced sample tank vacuum.

4.1.4.4 Note: If sampling had to be stopped before obtaining the minimum sampling time (specified in the applicable subpart) because a constant flow rate could not be maintained, proceed as follows: After closing the sample tank valve, remove the used sample tank from the sampling train (without disconnecting other portions of the sampling train). Take another evacuated and leak-checked sample tank, measure and record the tank vacuum, and attach the new tank to the sampling train. After the new tank is attached to the sample train, proceed with the sampling until the required minimum sampling time has been exceeded.

4.2 Sample Recovery. After sampling is completed, close the flow control valve, and record the final tank vacuum; then record the tank temperature and barometric pressure. Close the sample tank valve, and disconnect the sample tank from the sample system. Disconnect the condensate trap at the flowmetering system, and tightly seal both ends of the condensate trap. Do not include the probe from the stack to the filter as part of the condensate sample. Keep the trap packed in dry ice until the samples are returned to the laboratory for analysis. Ensure that run numbers are identified on the condensate trap and the sample tank(s).

4.3 Condensate Recovery. See Figure 25-9. Set the carrier gas flow rate, and heat the catalyst to its operating temperature to condition the apparatus.

4.3.1 Daily Performance Checks. Each day before analyzing any samples, perform the following tests:

4.3.1.1 Leak Check. With the carrier gas inlets and the sample recovery valve closed, install a clean condensate trap in the system, and evacuate the system to 10 mm Hg absolute pressure or less. Monitor the system pressure for 10 minutes. The system is acceptable if the pressure change is less than 2 mm Hg.

4.3.1.2 System Background Test. Adjust the carrier gas and auxiliary oxygen flow rate to their normal values of 100 cc/min and 150 cc/min, respectively, with the sample recovery valve in vent position. Using a 10-ml syringe withdraw a sample from the system effluent through the syringe port. Inject this sample into the NMO analyzer, and measure the CO₂ content. The system background is acceptable if the CO₂ concentration is less than 10 ppm.

4.3.1.3 Oxidation Catalyst Efficiency Check. Conduct a catalyst efficiency test as specified in Section 5.1.2 of this method. If the criterion of this test cannot be met, make the necessary repairs to the system before proceeding.

4.3.2 Condensate Trap CO₂ Purge and Sample Tank Pressurization.

4.3.2.1 After sampling is completed, the condensate trap will contain condensed water and organics and a small volume of sampled gas. This gas from the stack may contain a significant amount of CO₂ which must be removed from the condensate trap before the sample is recovered. This is accomplished by purging the condensate trap with zero air and collecting the purged gas in the original sample tank.

4.3.2.2 Begin with the sample tank and condensate trap from the test run to be analyzed. Set the four-port valve of the condensate recovery system in the CO₂ purge position as shown in Figure 25-9. With the sample tank valve closed, attach the sample tank to the sample recovery system. With the sample recovery valve in the vent position and the flow control valve fully open, evacuate the manometer or pressure gauge to the vacuum of the sample tank. Next, close the vacuum pump valve, open the sample tank valve, and record the tank pressure.

4.3.2.3 Attach the dry-ice-cooled condensate trap to the recovery system, and initiate the purge by switching the sample recovery valve from vent to collect position. Adjust the flow control valve to maintain atmospheric pressure in the recovery system. Continue the purge until the CO₂ concentration of the trap effluent is less than 5 ppm. CO₂ concentration in the trap effluent should be measured by extracting syringe samples from the recovery system and analyzing the samples with the NMO analyzer. This procedure should be used only after the NDIR response has reached a minimum level. Using a 10-ml syringe, extract a sample from the syringe port prior to the NDIR, and inject this sample into the NMO analyzer.

4.3.2.4 After the completion of the CO₂ purge, use the carrier gas bypass valve to pressurize the sample tank to approximately 1,060 mm Hg absolute pressure with zero air.

4.3.3 Recovery of the Condensate Trap Sample.

4.3.3.1 See Figure 25-10. Attach the ICV to the sample recovery system. With the sample recovery valve in a closed position, between vent and collect, and the flow control and ICV valves fully open, evacuate the manometer or gauge, the connecting tubing, and the ICV to 10 mm Hg absolute pressure. Close the flow-control and vacuum pump valves.

4.3.3.2 Begin auxiliary oxygen flow to the oxidation catalyst at a rate of 150 cc/min, then switch the four-way valve to the trap recovery position and the sample recovery valve to collect position. The system should now be set up to operate as indicated in Figure 25-10. After the manometer or pressure gauge begins to register a slight positive pressure, open the flow control valve. Adjust the flow-control valve to maintain atmospheric pressure in the system within 10 percent.

4.3.3.3 Now, remove the condensate trap from the dry ice, and allow it to warm to ambient temperature while monitoring the NDIR response. If after 5 minutes, the CO₂ concentration of the catalyst effluent is below 10,000 ppm, discontinue the auxiliary oxygen flow to the oxidation catalyst. Begin heating the trap by placing it in a furnace preheated to 200°C. Once heating has begun, carefully monitor the NDIR response to ensure that the catalyst effluent concentration does not exceed 50,000 ppm. Whenever the CO₂ concentration exceeds 50,000 ppm, supply auxiliary oxygen to the catalyst at the rate of 150 cc/min. Begin heating the tubing that connected the heated sample box to the condensate trap only after the CO₂ concentration falls below 10,000 ppm. This tubing may be heated in the same oven as the condensate trap or with an auxiliary heat source such as a heat gun. Heating temperature must not exceed 200°C. If a heat gun is used, heat the tubing slowly along its entire length from the upstream end to the downstream end, and repeat the pattern for a total of three times. Continue the recovery until the CO₂ concentration drops to less than 10 ppm as determined by syringe injection as described under the condensate trap CO₂ purge procedure, Section 4.3.2.

4.3.3.4 After the sample recovery is completed, use the carrier gas bypass valve to pressurize the ICV to approximately 1060 mm Hg absolute pressure with zero

air.

4.4 Analysis: Before putting the NMO analyzer into routine operation, conduct an initial performance test. Start the analyzer, and perform all the necessary functions in order to put the analyzer into proper working order; then conduct the performance test according to the procedures established in Section 5.2. Once the performance test has been successfully completed and the CO₂ and NMO calibration response factors have been determined, proceed with sample analysis as follows:

4.4.1 Daily operations and calibration checks. Before and immediately after the analysis of each set of samples or on a daily basis (whichever occurs first), conduct a calibration test according to the procedures established in Section 5.3. If the criteria of the daily calibration test cannot be met, repeat the NMO analyzer performance test (Section 5.2) before proceeding.

4.4.2 Operating Conditions. The carrier gas flow rate is 29.5 cc/min He and 2.2 cc/min O₂. The column oven is heated to 85°C. The order of elution for the sample from the column is CO, CH₄, CO₂, and NMO.

4.4.3 Analysis of Recovered Condensate Sample. Purge the sample loop with sample, and then inject the sample. Under the specified operating conditions, the CO₂ in the sample will elute in approximately 100 seconds. As soon as the detector response returns to baseline following the CO₂ peak, switch the carrier gas flow to backflush, and raise the column oven temperature to 195°C as rapidly as possible. A rate of 30°C/min has been shown to be adequate. Record the value obtained for the condensable organic material (C_{cm}) measured as CO₂ and any measured NMO. Return the column oven temperature to 85°C in preparation for the next analysis. Analyze each sample in triplicate, and report the average C_{cm}.

4.4.4 Analysis of Sample Tank. Perform the analysis as described in Section 4.4.3, but record only the value measured for NMO (C_{tm}).

4.5 Audit Samples.

4.5.1 Analyze a set of two audit samples concurrently with any compliance samples and in exactly the same manner to evaluate the analyst's technique and the instrument calibration. The same analysts, analytical reagents, and analytical system shall be used for the compliance samples and the EPA audit samples; if this condition is met, auditing of subsequent compliance analyses for the same enforcement agency within 30 days is not required. An audit sample set may not be used to validate different sets of compliance samples under the jurisdiction of different enforcement agencies, unless prior arrangements are made with both enforcement agencies.

4.5.2 Calculate the concentrations of the audit samples in ppm using the specified sample volume in the audit instructions.

4.5.3 Note: Indication of acceptable results may be obtained immediately by reporting the audit results in ppm and compliance results in ppm by telephone to the responsible enforcement agency.) Include the results of both audit samples, their identification numbers, and the analyst's name with the results of the compliance determination samples in appropriate reports to the EPA regional office or the appropriate enforcement agency during the 30-day period.

4.5.4 The concentration of the audit samples obtained by the analyst shall agree within 20 percent of the actual concentrations. Failure to meet the 20-percent specification may require retests until the audit problems are resolved. However, if the audit results do not affect the compliance or noncompliance

status of the affected facility, the Administrator may waive the reanalysis requirement, further audits, or retests and accept the results of the compliance test. While steps are being taken to resolve audit analysis problems, the Administrator may also choose to use the data to determine the compliance or noncompliance of the affected facility.

5. CALIBRATION AND OPERATIONAL CHECKS

Maintain a record of performance of each item.

5.1 Initial Performance Check of Condensate Recovery Apparatus. Perform these tests before the system is first placed in operation, after any shutdown of 6 months or more, and after any major modification of the system, or at the specified frequency.

5.1.1 Carrier Gas and Auxiliary O₂ Blank Check. Analyze each new tank of carrier gas or auxiliary O₂ with the NMO analyzer to check for contamination. Treat the gas cylinders as noncondensable gas samples, and analyze according to the procedure in Section 4.4.3. Add together any measured CH₄, CO, CO₂, or NMO. The total concentration must be less than 5 ppm.

5.1.2 Catalyst Efficiency Check.

5.1.2.1 With a clean condensate trap installed in the recovery system, replace the carrier gas cylinder with the high level methane standard gas cylinder (Section 3.4.1). Set the four-port valve to the recovery position, and attach an ICV to the recovery system. With the sample recovery valve in vent position and the flow-control and ICV valves fully open, evacuate the manometer or gauge, the connecting tubing, and the ICV to 10 mm Hg absolute pressure. Close the flow-control and vacuum pump valves.

5.1.2.2 After the NDIR response has stabilized, switch the sample recovery valve from vent to collect. When the manometer or pressure gauge begins to register a slight positive pressure, open the flow-control valve. Keep the flow adjusted so that atmospheric pressure is maintained in the system within 10 percent. Continue collecting the sample in a normal manner until the ICV is filled to a nominal gauge pressure of 300 mm Hg. Close the ICV valve, and remove the ICV from the system. Place the sample recovery valve in the vent position, and return the recovery system to its normal carrier gas and normal operating conditions. Analyze the ICV for CO₂ using the NMO analyzer; the catalyst efficiency is acceptable if the CO₂ concentration is within 2 percent of the methane standard concentration.

5.1.3 System Performance Check. Construct a liquid sample injection unit similar in design to the unit shown in Figure 25-7. Insert this unit into the condensate recovery and conditioning system in place of a condensate trap, and set the carrier gas and auxiliary O₂ flow rates to normal operating levels. Attach an evacuated ICV to the system, and switch from system vent to collect. With the carrier gas routed through the injection unit and the oxidation catalyst, inject a liquid sample (See 5.1.3.1 to 5.1.3.4) into the injection port. Operate the trap recovery system as described in Section 4.3.3. Measure the final ICV pressure, and then analyze the vessel to determine the CO₂ concentration. For each injection, calculate the percent recovery using the equation in Section 6.6. The performance test is acceptable if the average percent recovery is 100 ± 10 percent with a relative standard deviation (Section 6.9) of less than 5 percent for each set of triplicate injections as follows:

5.1.3.1 50 μ l hexane.

5.1.3.2 10 μ l hexane.

5.1.3.3 50 μ l decane.

5.1.3.4 10 μ l decane.

5.2 Initial NMO Analyzer Performance Test. Perform these tests before the system is first placed in operation, after any shutdown longer than 6 months, and after any major modification of the system.

5.2.1 Oxidation Catalyst Efficiency Check. Turn off or bypass the NMO analyzer reduction catalyst. Make triplicate injections of the high level methane standard (Section 3.4.1). The oxidation catalyst operation is acceptable if the FID response is less than 1 percent of the injected methane concentration.

5.2.2 Reduction Catalyst Efficiency Check. With the oxidation catalyst unheated or bypassed and the heated reduction catalyst bypassed, make triplicate injections of the high level methane standard (Section 3.4.1). Repeat this procedure with both catalysts operative. The reduction catalyst operation is acceptable if the response under both conditions agree within 5 percent.

5.2.3 Analyzer Linearity Check and NMO Calibration. While operating both the oxidation and reduction catalysts, conduct a linearity check of the analyzer using the propane standards specified in Section 3.4.2. Make triplicate injections of each calibration gas, and then calculate the average response factor (area/ppm C) for each gas, as well as the overall mean of the response factor values. The instrument linearity is acceptable if the average response factor of each calibration gas is within 2.5 percent of the overall mean value and if the relative standard deviation (Section 6.9) for each set of triplicate injections is less than 2 percent. Record the overall mean of the propane response factor values as the NMO calibration response factor (RF_{NMO}).

Repeat the linearity check using the CO_2 standards specified in Section 3.4.3. Make triplicate injections of each gas, and then calculate the average response factor (area/ppm C) for each gas, as well as the overall mean of the response factor values. Record the overall mean of the response factor values as the CO_2 calibration response factor (RF_{CO_2}). The RF_{CO_2} must be within 10 percent of the RF_{NMO} .

5.2.4 System Performance Check. Check the column separation and overall performance of the analyzer by making triplicate injections of the calibration gases listed in Section 3.4.4. The analyzer performance is acceptable if the measured NMO value for each gas (average of triplicate injections) is within 5 percent of the expected value.

5.3 NMO Analyzer Daily Calibration.

5.3.1 CO_2 Response Factor. Inject triplicate samples of the high level CO_2 calibration gas (Section 3.4.3), and calculate the average response factor. The system operation is adequate if the calculated response factor is within 5 percent of the RF_{CO_2} calculated during the initial performance test (Section 5.2.3). Use the daily response factor (DRF_{CO_2}) for analyzer calibration and the calculation of measured CO_2 concentrations in the ICV samples.

5.3.2 NMO Response Factors. Inject triplicate samples of the mixed propane calibration cylinder (Section 3.4.4.1), and calculate the average NMO response factor. The system operation is adequate if the calculated response factor is within 5 percent of the RF_{NMO} calculated during the initial performance test (Section 5.2.4). Use the daily response factor (DRF_{NMO}) for analyzer calibration and calculation of NMO concentrations in the sample tanks.

5.4 Sample Tank and ICV Volume. The volume of the gas sampling tanks used must

be determined. Determine the tank and ICV volumes by weighing them empty and then filled with deionized distilled water; weigh to the nearest 5 g, and record the results. Alternatively, measure the volume of water used to fill them to the nearest 5 ml.

6. CALCULATIONS

All equations are written using absolute pressure; absolute pressures are determined by adding the measured barometric pressure to the measured gauge or manometer pressure.

6.1 Nomenclature.

- C = TGNMO concentration of the effluent, ppm C equivalent.
- C_c = Calculated condensible organic (condensate trap) concentration of the effluent, ppm C equivalent.
- C_{cm} = Measured concentration (NMO analyzer) for the condensate trap ICV, ppm CO_2 .
- C_t = Calculated noncondensable organic concentration (sample tank) of the effluent, ppm C equivalent.
- C_{tm} = Measured concentration (NMO analyzer) for the sample tank, ppm NMO.
- F = Sampling flow rate, cc/min.
- L = Volume of liquid injected, μ l.
- M = Molecular weight of the liquid injected, g/g-mole.
- m_c = TGNMO mass concentration of the effluent, mg C/dsm³.
- N = Carbon number of the liquid compound injected ($N = 12$ for decane, $N = 6$ for hexane).
- P_f = Final pressure of the intermediate collection vessel, mm Hg absolute.
- P_b = Barometric pressure, cm Hg.
- P_{ti} = Gas sample tank pressure before sampling, mm Hg absolute.
- P_t = Gas sample tank pressure after sampling, but before pressurizing, mm Hg absolute.
- P_{tf} = Final gas sample tank pressure after pressurizing, mm Hg absolute.
- T_f = Final temperature of intermediate collection vessel, $^{\circ}K$.
- T_{ti} = Sample tank temperature before sampling, $^{\circ}K$.
- T_t = Sample tank temperature at completion of sampling, $^{\circ}K$.
- T_{tf} = Sample tank temperature after pressurizing, $^{\circ}K$.
- V = Sample tank volume, m³.
- V_t = Sample train volume, cc.

V_v = Intermediate collection vessel volume, m^3 .

V_s = Gas volume sampled, dm^3 .

n = Number of data points.

q = Total number of analyzer injections of intermediate collection vessel during analysis (where k = injection number, 1 ... q).

r = Total number of analyzer injections of sample tank during analysis (where j = injection number, 1 ... r).

x_i = Individual measurements.

\bar{x} = Mean value.

ρ = Density of liquid injected, g/cc .

Θ = Leak check period, min.

ΔP = Allowable pressure change, $cm\ Hg$.

6.2 Allowable Pressure Change. For the pretest leak check, calculate the allowable pressure change:

$$\Delta P = 0.01 \frac{FP_b \Theta}{V_t} \quad \text{Eq. 25-1}$$

6.3 Sample Volume. For each test run, calculate the gas volume sampled:

$$V_s = 0.3857 V \left(\frac{P_t}{T_t} - \frac{P_{ti}}{T_{ti}} \right) \quad \text{Eq. 25-2}$$

6.4 Noncondensable Organics. For each sample tank, determine the concentration of nonmethane organics (ppm C):

$$C_t = \left[\frac{\frac{P_{tf}}{T_{tf}}}{\frac{P_t}{T_t} - \frac{P_{ti}}{T_{ti}}} \right] \left[\frac{1}{r} \sum_{j=1}^r C_{tm_j} \right] \quad \text{Eq. 25-3}$$

6.5 Condensable Organics. For each condensate trap determine the concentration of organics (ppm C):

$$C_c = 0.3857 \frac{V_v P_f}{V_s T_f} \left[\frac{1}{q} \sum_{k=1}^q C_{cm_k} \right] \quad \text{Eq. 25-4}$$

6.6 TGNMO. To determine the TGNMO concentration for each test run, use the following equation:

$$C = C_t + C_c \quad \text{Eq. 25-5}$$

6.7 TGNMO Mass Concentration. To determine the TGNMO mass concentration as carbon for each test run, use the following equation:

$$m_c = 0.4993C \quad \text{Eq. 25-6}$$

6.8 Percent Recovery. To calculate the percent recovery for the liquid injections to the condensate recovery and conditioning system use the following equation:

$$\text{Percent Recovery} = 1.604 \frac{M V_v P_t C_{cm}}{L P T_f N} \quad \text{Eq. 25-7}$$

6.9 Relative Standard Deviation.

$$\text{RSD} = \frac{100}{\bar{x}} \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}} \quad \text{Eq. 25-8}$$

7. BIBLIOGRAPHY

1. Salo, Albert E., Samuel Witz, and Robert D. MacPhee. Determination of Solvent Vapor Concentrations by Total Combustion Analysis: A Comparison of Infrared with Flame Ionization Detectors. Paper No. 75-33.2. (Presented at the 68th Annual Meeting of the Air Pollution Control Association. Boston, MA. June 15-20, 1975.) 14 p.
2. Salo, Albert E., William L. Oaks, and Robert D. MacPhee. Measuring the Organic Carbon Content of Source Emissions for Air Pollution Control. Paper No. 74-190. (Presented at the 67th Annual Meeting of the Air Pollution Control Association. Denver, CO. June 9-13, 1974.) 25 p.

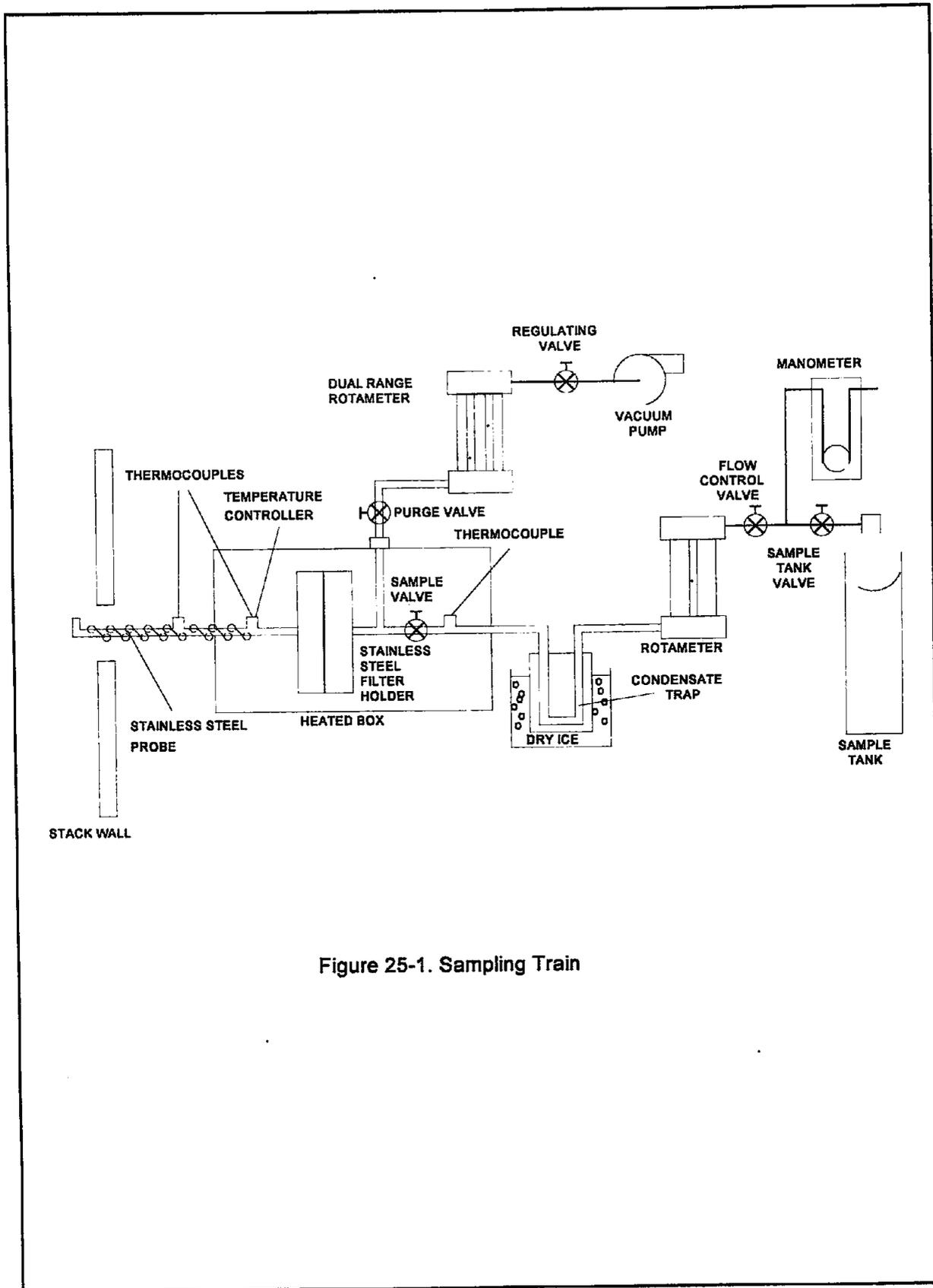


Figure 25-1. Sampling Train

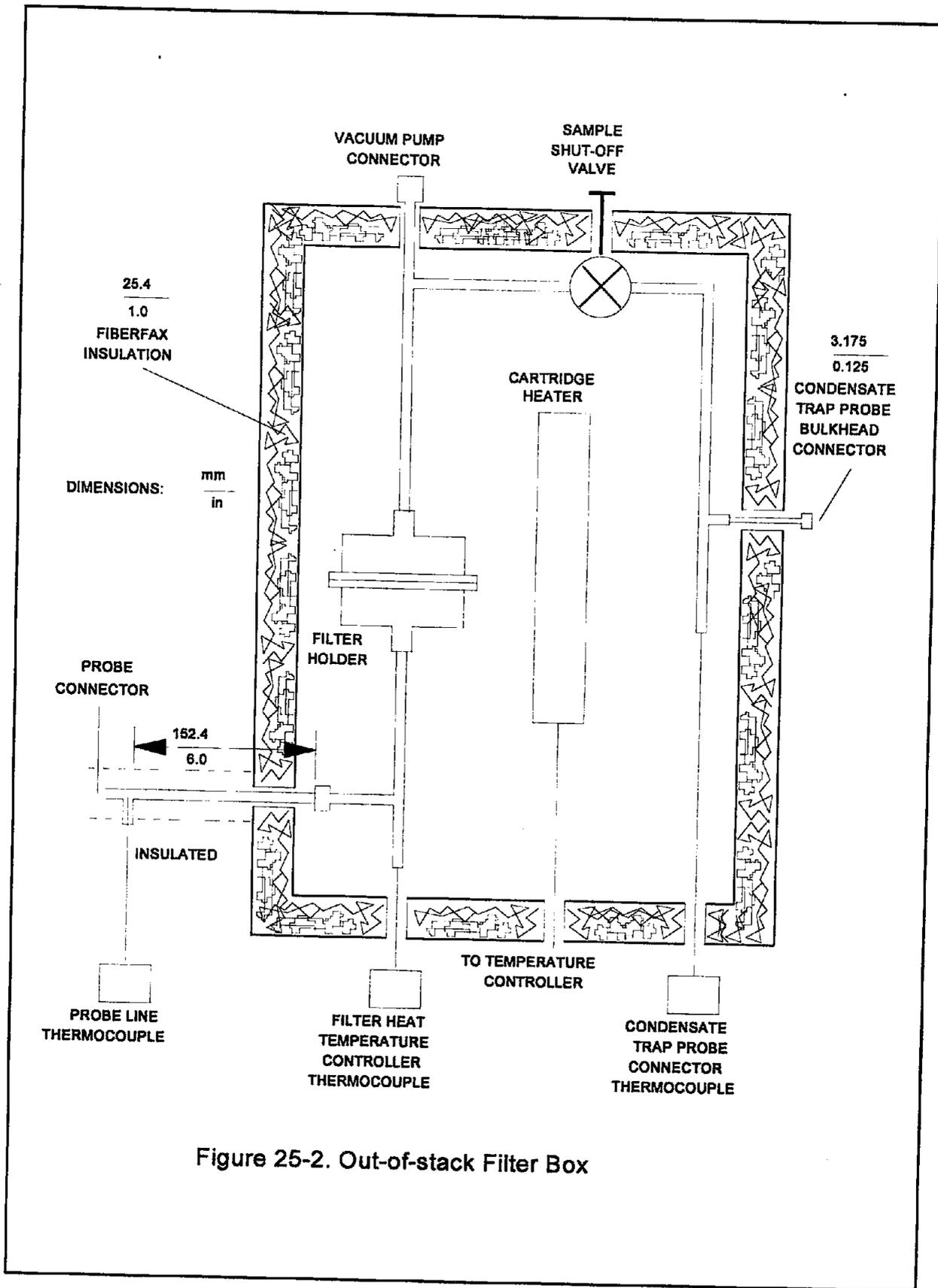
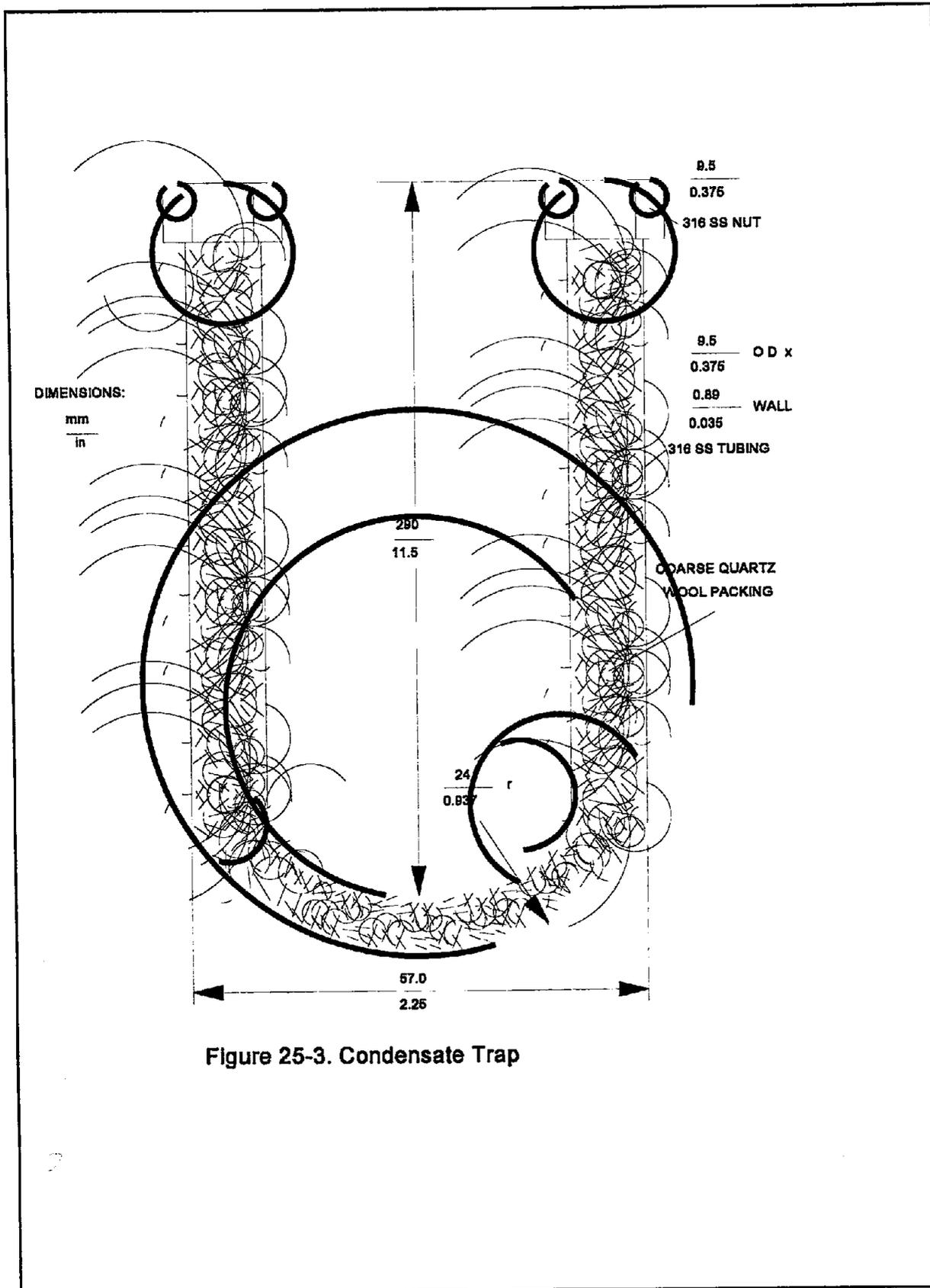


Figure 25-2. Out-of-stack Filter Box



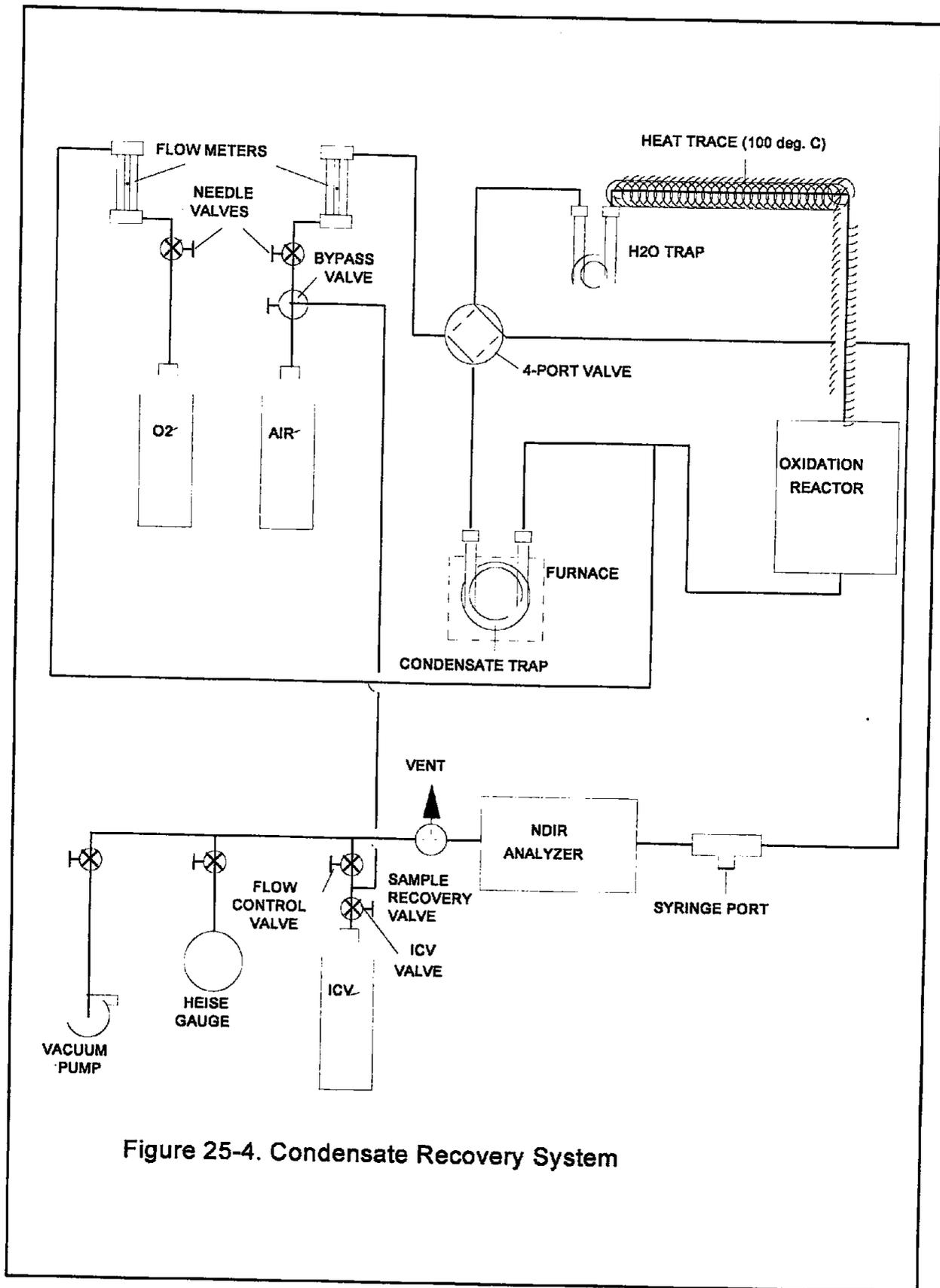


Figure 25-4. Condensate Recovery System

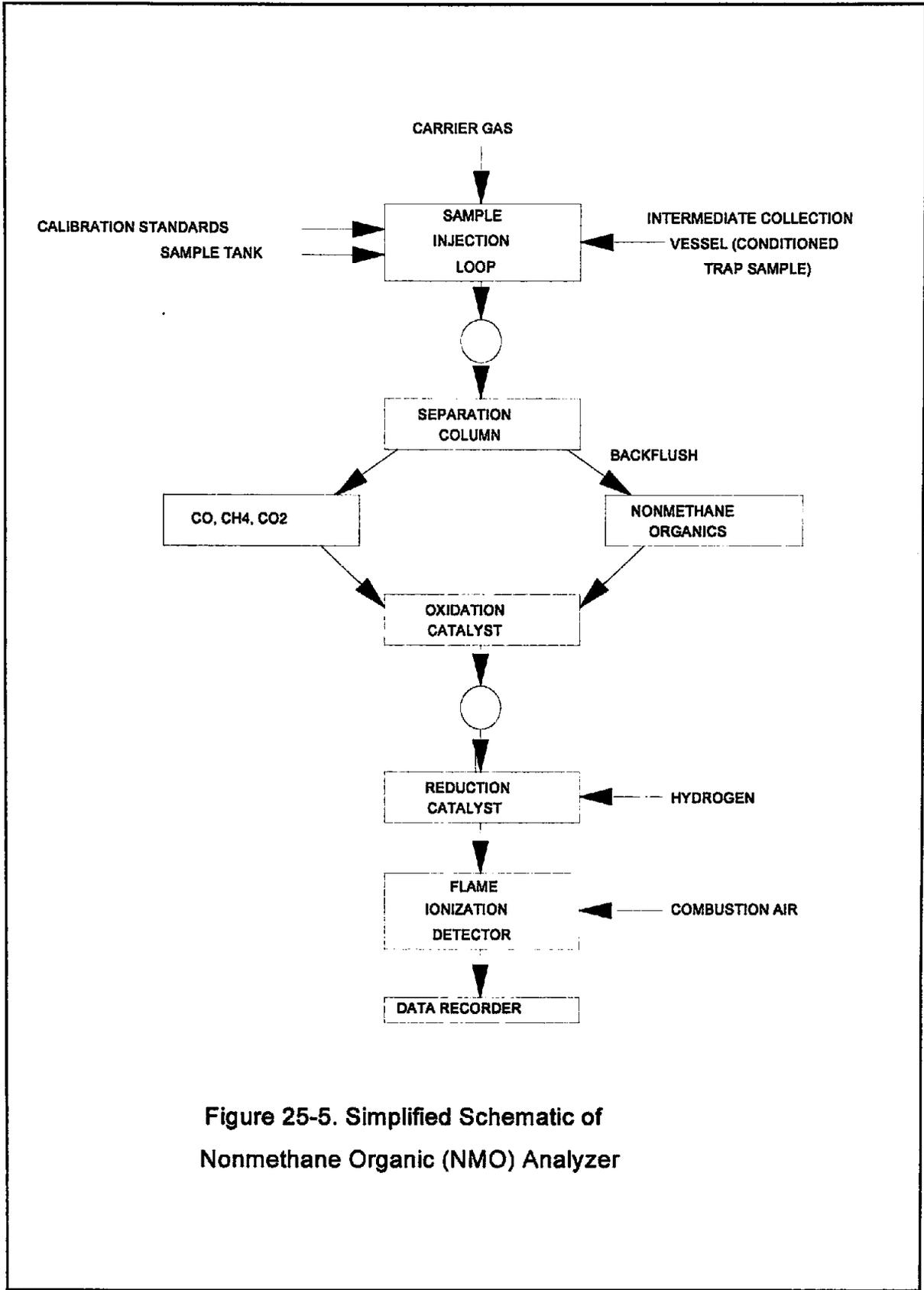


Figure 25-5. Simplified Schematic of Nonmethane Organic (NMO) Analyzer

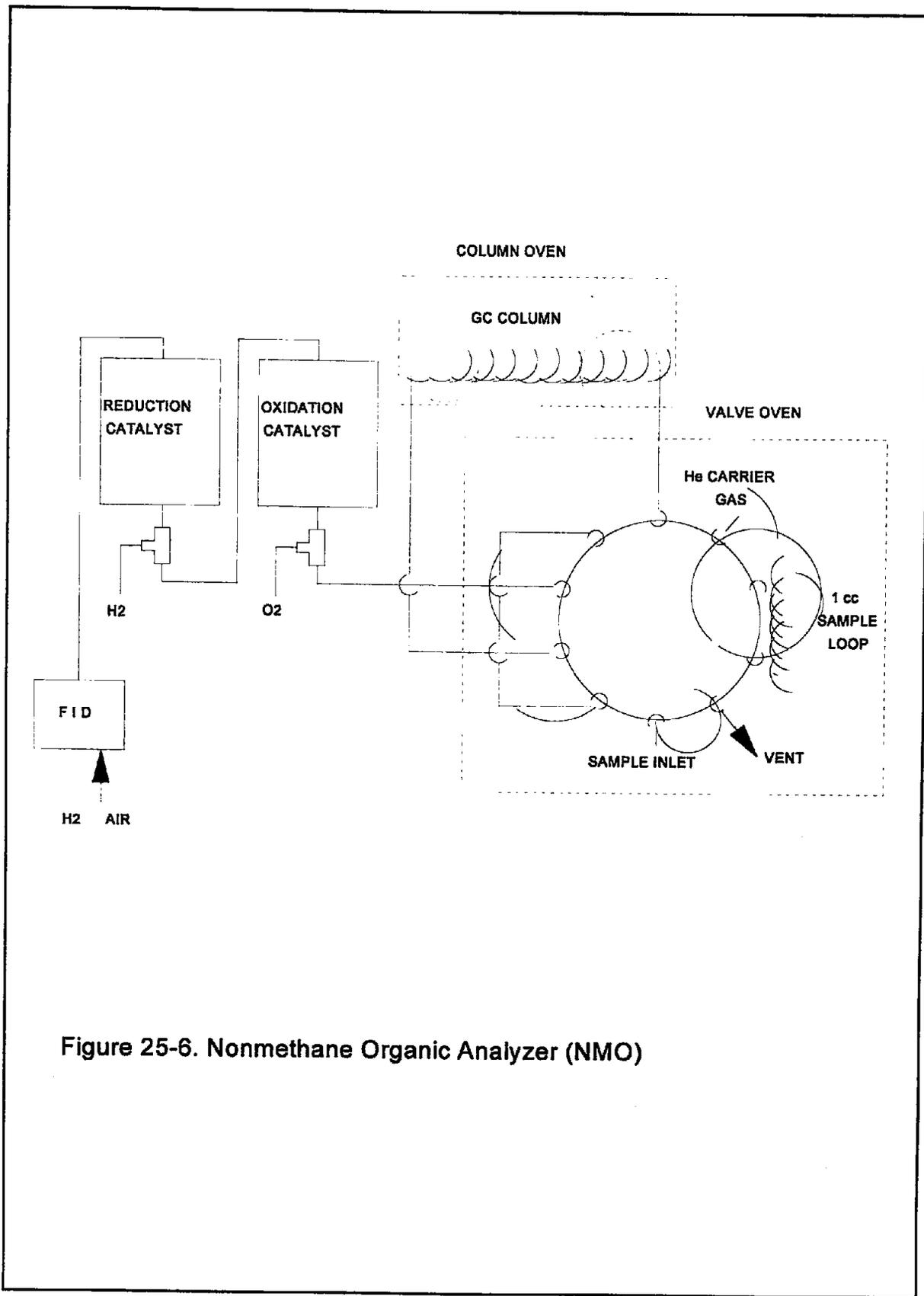


Figure 25-6. Nonmethane Organic Analyzer (NMO)

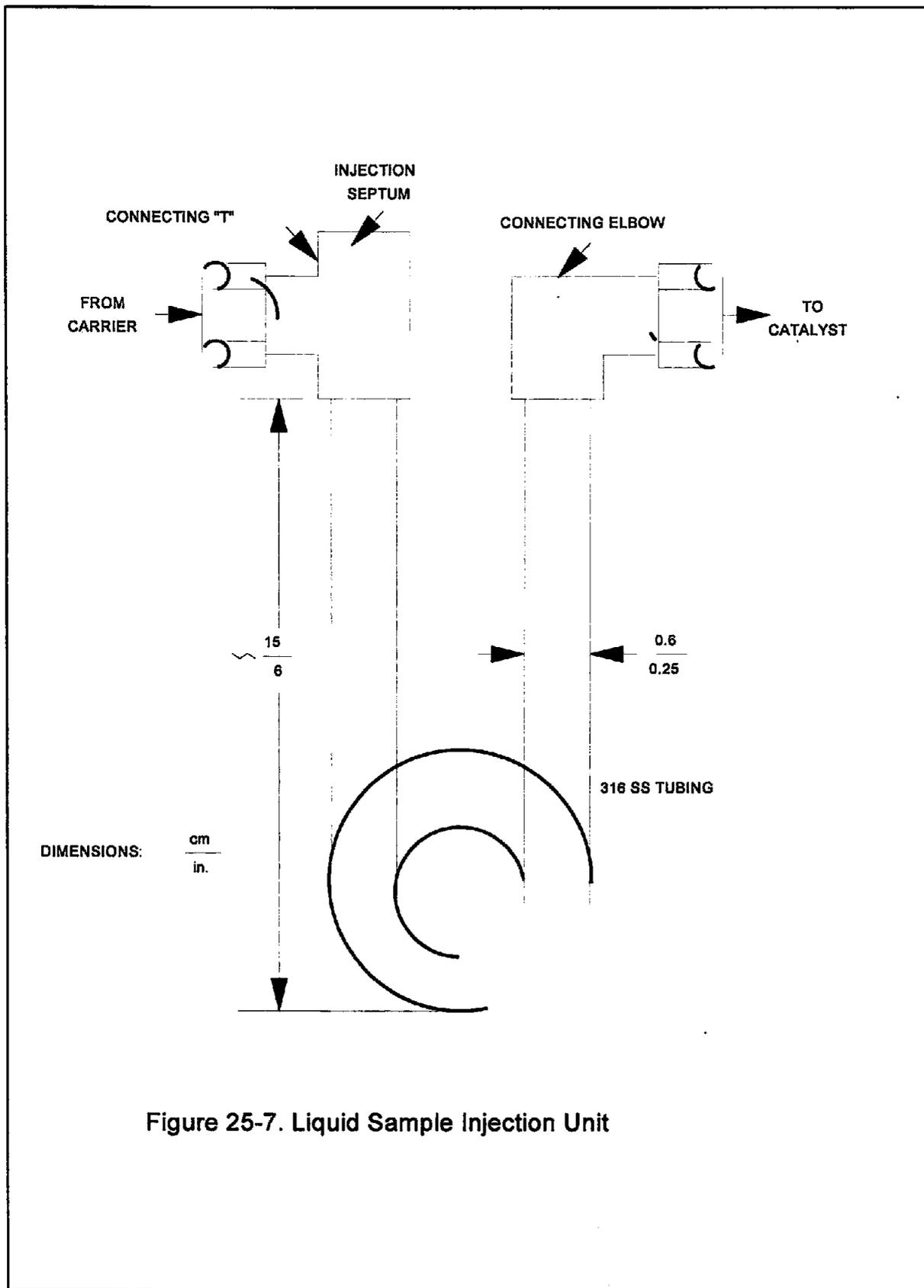


Figure 25-7. Liquid Sample Injection Unit

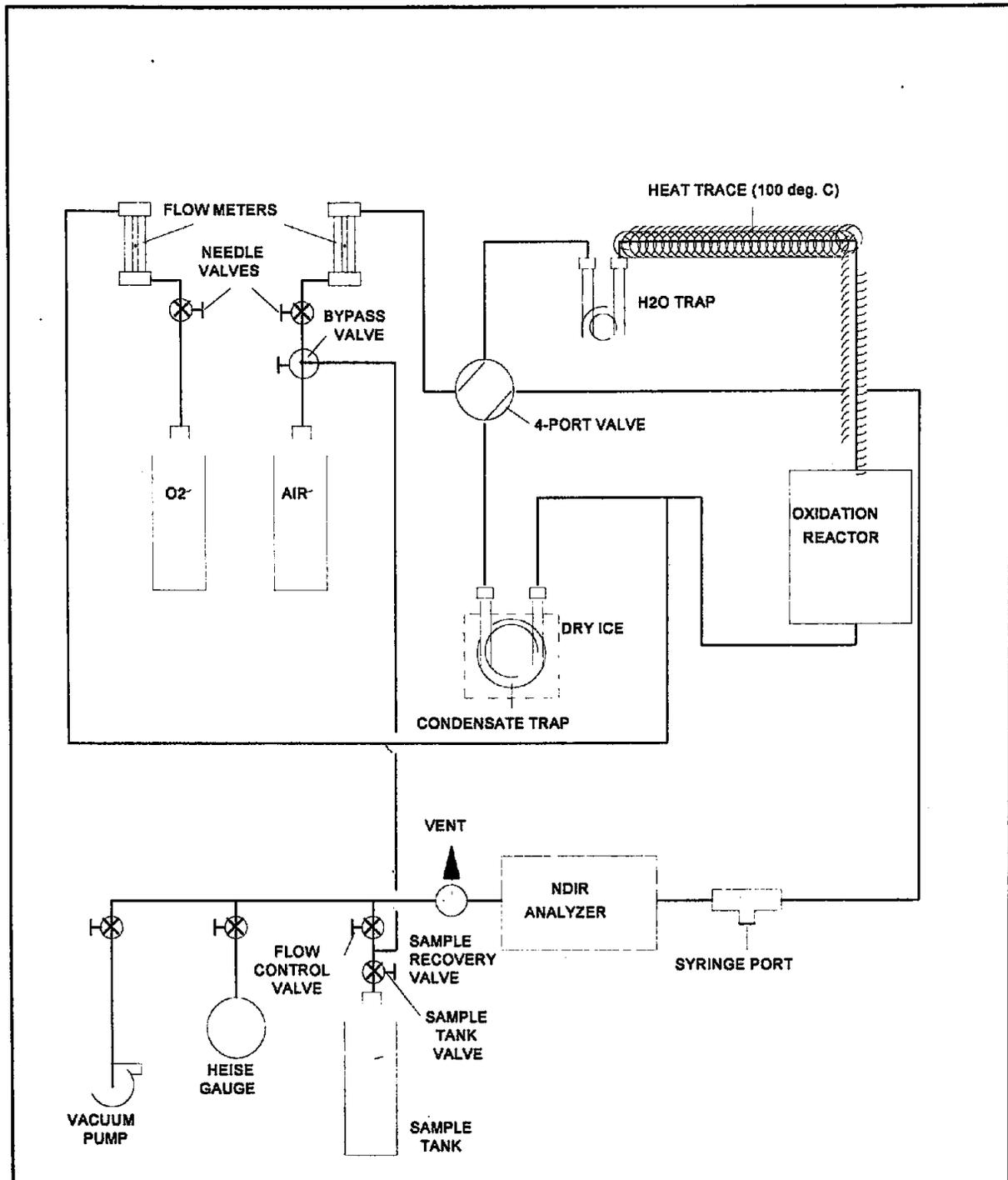


Figure 25-9. Condensate Recovery System, CO₂ Purge

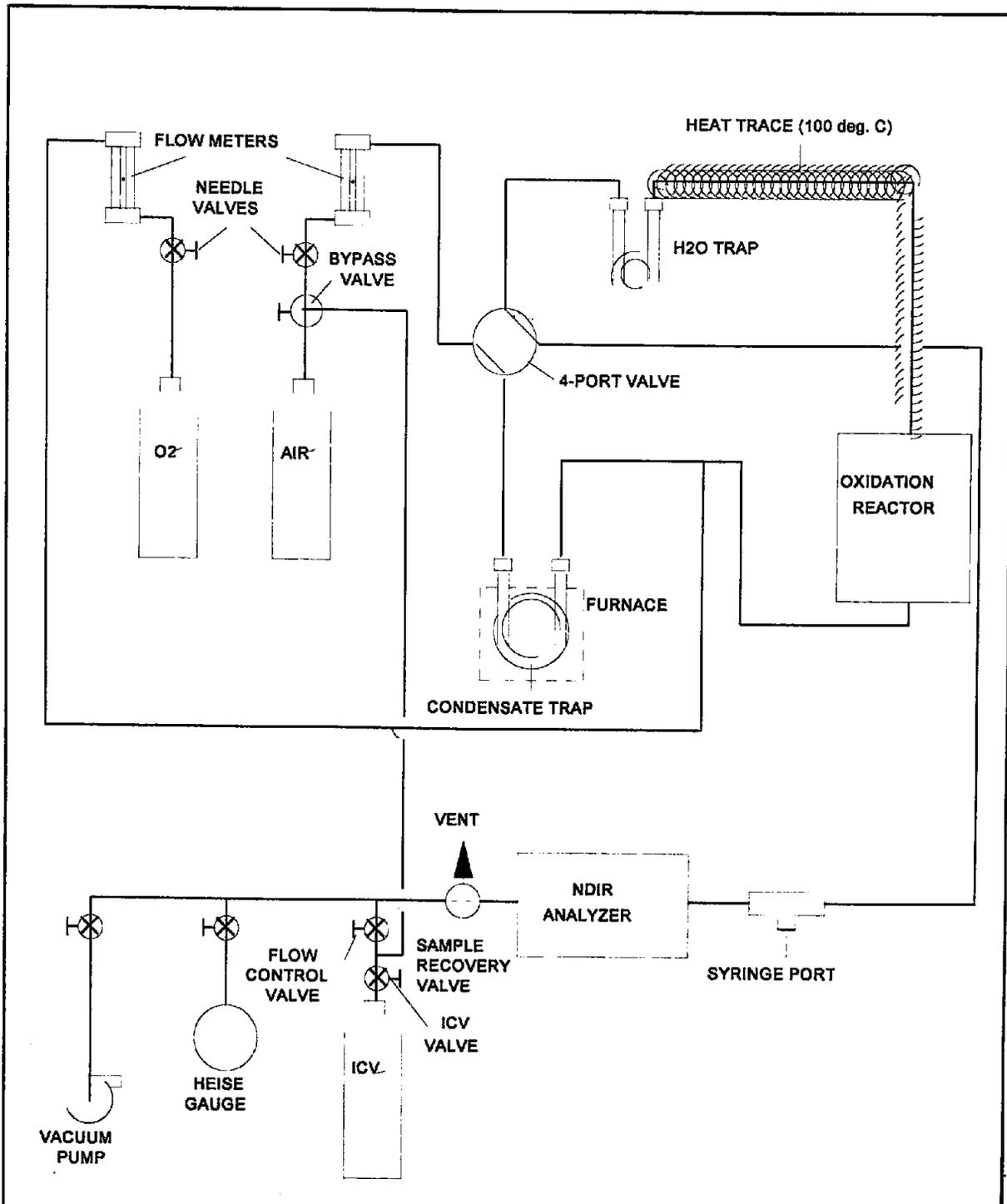


Figure 25-10. Condensate Recovery System,
Collection of Trap Organics

APÉNDICE A MÉTODO 25C DEL 40 CRF PARTE 60

METHOD 25C- DETERMINATION OF NONMETHANE ORGANIC
COMPOUNDS (NMOC) IN MSW LANDFILL GASES

1. Applicability and Principle

1.1 Applicability. This method is applicable to the sampling and measurement of nonmethane organic compounds (NMOC) as carbon in MSW landfill gases.

1.2 Principle. A sample probe that has been perforated at one end is driven or augered to a depth of 1.0 meter below the bottom of the landfill cover. A sample of the landfill gas is extracted with an evacuated cylinder. The NMOC content of the gas is determined by injecting a portion of the gas into a gas chromatographic column to separate the NMOC from carbon monoxide (CO), carbon dioxide (CO₂), and methane (CH₄); the NMOC are oxidized to CO₂, reduced to CH₄, and measured by a flame ionization detector (FID). In this manner, the variable response of the FID associated with different types of organics is eliminated.

2. Apparatus

2.1 Sample Probe. Stainless steel, with the bottom third perforated. The sample probe shall be capped at the bottom and shall have a threaded cap with a sampling attachment at the top. The sample probe shall be long enough to go through and extend no less than 1.0 meter below the landfill cover. If the sample probe is to be driven into the landfill, the bottom cap should be designed to facilitate driving the probe into the landfill.

2.2 Sampling Train.

2.2.1 Rotameter with Flow Control Valve. Capable of measuring a sample flow rate of 500 ml/min or less (30.5 ± 3.1 m³/min). The control valve shall be made of stainless steel.

2.2.2 Sampling Valve. Stainless steel.

2.2.3 Pressure Gauge. U-tube mercury manometer, or equivalent, capable of measuring pressure to within 1 mm Hg in the range of 0 to 1,100 mm Hg.

2.2.4 Sample Tank. Stainless steel or aluminum cylinder, with a minimum volume of 4 liters and equipped with a stainless steel sample tank valve.

2.3 Vacuum Pump. Capable of evacuating to an absolute pressure of 10 mm Hg.

2.4 Purging Pump. Portable, explosion proof, and suitable for sampling NMOC.

2.5 Pilot Probe Procedure. The following are needed only if the tester chooses to use the procedure described in section 4.2.1.

2.5.1 Pilot Probe. Tubing of sufficient strength to withstand being driven into the landfill by a post driver and an outside diameter of at least 6.0 millimeters smaller than the sample probe. The pilot probe shall be capped on both ends and long enough to go through the landfill cover and extend no less than 1.0 meter into the landfill.

2.5.2 Post Driver and Compressor. Capable of driving the pilot probe and the sampling probe into the landfill.

2.6 Auger Procedure. The following are needed only if the tester chooses to use the procedure described in section 4.2.2.

2.6.1 Auger. Capable of drilling through the landfill cover and to a depth of no less than 0.9 meters into the landfill.

2.6.2 Pea Gravel.

2.6.3 Bentonite.

2.7 NMOC Analyzer, Barometer, Thermometer, and Syringes. Same as in sections 2.3, 2.4.1, 2.4.2, 2.4.4, respectively, of Method 25.

3. Reagents

3.1 NMOC Analysis. Same as in Method 25, section 3.2.

3.2 Calibration. Same as in Method 25, section 3.4, except omit section 3.4.3.

4. Procedure

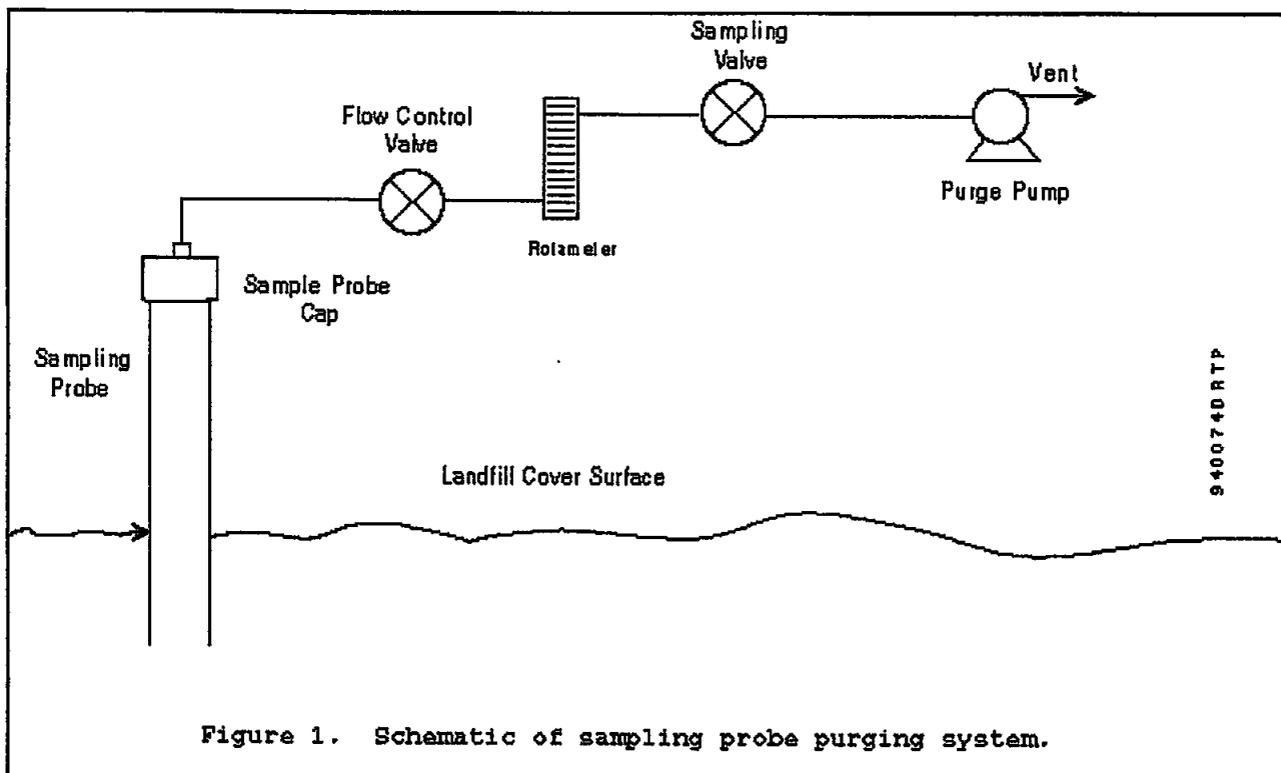
4.1 Sample Tank Evacuation and Leak Check. Conduct the sample tank evacuation and leak check either in the laboratory or the field. Connect the pressure gauge and sampling valve to the sample tank. Evacuate the sample tank to 10 mm Hg absolute pressure or less. Close the sampling valve, and allow the tank to sit for 60 minutes. The tank is acceptable if no change is noted. Include the results of the leak check in the test report.

4.2 Sample Probe Installation. The tester may use the procedure in sections 4.2.1 or 4.2.2. CAUTION: Since this method is complex, only experienced personnel should perform this test. LFG contains methane, therefore explosive mixtures may exist on or near the landfill. It is advisable to take appropriate safety precautions when testing landfills, such as refraining from smoking and installing explosion-proof equipment.

4.2.1 Pilot Probe Procedure. Use the post driver to drive the pilot probe at least 1.0 meter below the landfill cover. Alternative procedures to drive the probe into the landfill may be used subject to the approval of the Administrator.

Remove the pilot probe and drive the sample probe into the hole left by the pilot probe. The sample probe shall extend not less than 1.0 meter below the landfill cover and shall protrude about 0.3 meters above the landfill cover. Seal around the sampling probe with bentonite and cap the sampling probe with the sampling probe cap.

4.2.2 Auger Procedure. Use an auger to drill a hole through the landfill cover and to at



least 1.0 meter below the landfill cover. Place the sample probe in the hole and backfill with pea gravel to a level 0.6 meters from the surface. The sample probe shall protrude at least 0.3 meters above the landfill cover. Seal the remaining area around the probe with bentonite. Allow 24 hours for the landfill gases to equilibrate inside the augered probe before sampling.

4.3 Sample Train Assembly. Prepare the sample by evacuating and filling the sample tank with helium three times. After the third evacuation, charge the sample tank with helium to a pressure of approximately 325 mm Hg. Record the pressure, the ambient temperature, and the barometric pressure. Assemble the sampling probe purging system as shown in figure 1.

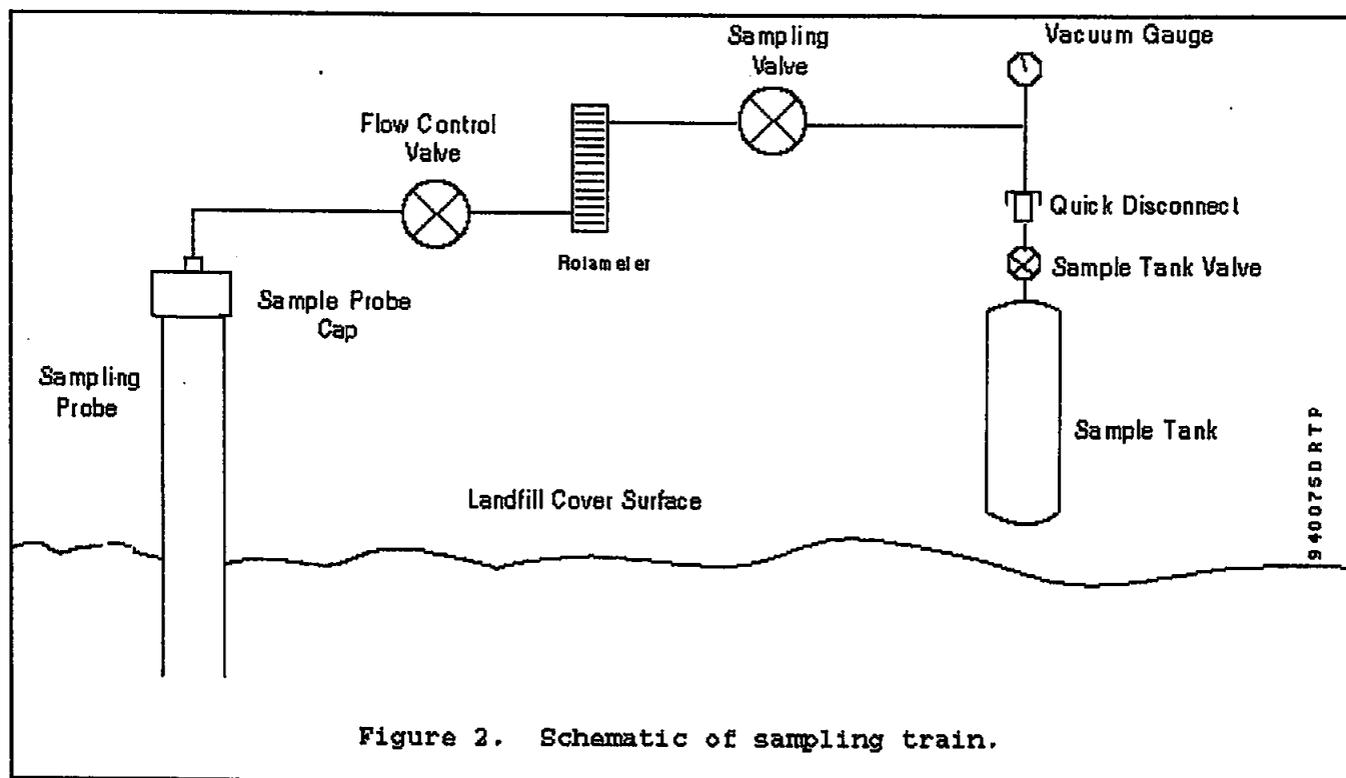


Figure 2. Schematic of sampling train.

4.4 Sampling Procedure. Open the sampling valve and use the purge pump and the flow control valve to evacuate at least two sample probe volumes from the system at a flow rate of 500 ml/min or less ($30.5 \pm 3.1 \text{ m}^3/\text{min}$). Close the sampling valve and replace the purge pump with the sample tank apparatus as shown in figure 2. Open the sampling valve and the sample tank valves and, using the flow control valve, sample at a flow rate of 500 ml/min or less ($30.5 \pm 3.1 \text{ m}^3/\text{min}$) until the sample tank gauge pressure is zero. Disconnect the sampling tank apparatus and use the carrier gas bypass valve to pressurize the sample cylinder to approximately 1,060 mm Hg absolute pressure with helium and record the final pressure. Alternatively, the sample tank may be pressurized in the lab. If not analyzing for N_2 , the sample cylinder may be pressurized with zero air. Use Method 3C to determine the percent N_2 in the sample. Presence of N_2 indicates infiltration of ambient air into the gas sample. The landfill sample is

acceptable if the concentration of N₂ is less than 20 percent.

4.5 Analysis. The oxidation, reduction, and measurement of NMOC is similar to Method 25. Before putting the NMOC analyzer into routine operation, conduct an initial performance test. Start the analyzer, and perform all the necessary functions to put the analyzer into proper working order. Conduct the performance test according to the procedures established in section 5.1. Once the performance test has been successfully completed and the NMOC calibration response factor has been determined, proceed with sample analysis as follows:

4.5.1 Daily Operations and Calibration Checks. Before and immediately after the analysis of each set of samples or on a daily basis (whichever occurs first), conduct a calibration test according to the procedures established in section 5.2. If the criteria of the daily calibration test cannot be met, repeat the NMOC analyzer performance test (section 5.1) before proceeding.

4.5.2 Operating Conditions. Same as in Method 25, section 4.4.2.

4.5.3 Analysis of Sample Tank. Purge the sample loop with sample, and then inject the sample. Under the specified operating conditions, the CO₂ in the sample will elute in approximately 100 seconds. As soon as the detector response returns to baseline following the CO₂ peak, switch the carrier gas flow to backflush, and raise the column oven temperature to 195 °C as rapidly as possible. A rate of 30 °C/min has been shown to be adequate. Record the value obtained for any measured NMOC. Return the column oven temperature to 85 °C in preparation for the next analysis. Analyze each sample in triplicate, and report the average as C_{tm}.

4.6 Audit Samples. Same as in Method 25, section 4.5.

4.7 Deactivation of Sample Probe Holes. Once sampling has taken place, either plug the

sampling probes with a cap or remove the probes and refill the hole with cover material.

5. Calibration and Operational Checks

Maintain a record of performance of each item.

5.1 Initial NMOC Analyzer Performance Test. Same as in Method 25, section 5.2, except omit the linearity checks for CO₂ standards.

5.2 NMOC Analyzer Daily Calibration. NMOC response factors, same as in Method 25, section 5.3.2.

6. Calculations

All equations are written using absolute pressure; absolute pressures are determined by adding the measured barometric pressure to the measured gauge of manometer pressure.

6.1 Nomenclature.

B_w = moisture content in the sample, fraction

C_{N_2} = measured N₂ concentration, fraction

C_t = calculated NMOC concentration, ppmv C equivalent

C_{tm} = measured NMOC concentration, ppmv C equivalent

P_b = barometric pressure, mm Hg

P_{ti} = gas sample tank pressure before sampling, mm Hg absolute

P_t = gas sample tank pressure at completion of sampling, but before pressurizing, mm Hg absolute

P_{tf} = final gas sample tank pressure after pressurizing, mm Hg absolute

P_w = vapor pressure of H₂O (from table 25C-1), mm Hg

T_{ti} = sample tank temperature before sampling, °K

T_t = sample tank temperature at completion of sampling, but before pressuring, °K

T_{tf} = sample tank temperature after pressurizing, °K

r = total number of analyzer injections of sample tank during analysis (where j = injection number, 1... r)

6.2 Water Correction. Use table 25C-1, the LFG temperature, and barometric pressure at the sampling site to calculate B_w .

$$B_w = \frac{P_w}{P_b}$$

Table 25C-1. MOISTURE CORRECTION

| Temperature, °C | Vapor Pressure of H ₂ O, mm Hg | Temperature, °C | Vapor Pressure of H ₂ O, mm Hg |
|-----------------|---|-----------------|---|
| 4 | 6.1 | 18 | 15.5 |
| 6 | 7.0 | 20 | 17.5 |
| 8 | 8.0 | 22 | 19.8 |
| 1 | 9.2 | 24 | 22.4 |
| 12 | 10.5 | 26 | 25.2 |
| 14 | 12.0 | 28 | 28.3 |
| 16 | 13.6 | 30 | 31.8 |

6.3 NMOC Concentration. Use the following equation to calculate the concentration of NMOC for each sample tank.

$$C_t = \left(\frac{\frac{P_{tf}}{T_{tf}}}{\frac{P_t - P_{ti}}{T_t - T_{ti}}} \right) \frac{1}{(1 - B_w - C_{N_2})} \sum_{j=1}^r C_{im}^{(j)}$$

7. Bibliography

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JUNTA DE CALIDAD AMBIENTAL



AVISO AMBIENTAL INTENCION DE ADOPTAR LAS GUIAS DE EMISION PARA VERTEDEROS DE DESPERDICIOS SOLIDOS MUNICIPALES Y PROMULGAR LAS DISPOSICIONES DE REGLAMENTARIAS PARA IMPLANTAR LAS GUIAS

El 12 de mayo de 1996, la Agencia de Protección Ambiental Federal (EPA), por sus siglas en inglés, promulgó las Guías de Emisión para Vertederos de Desperdicios Sólidos Municipales (Vertedero DSM) y las Normas de Rendimiento para Fuentes Nuevas de Vertederos DSM nuevos. La Ley Federal de Aire Limpio (CAA), por sus siglas en inglés requiere que las Agencias Reguladoras implementen las Guías de Emisión de acuerdo a el Plan Estatal desarrollado bajo la Sección 111(b) del CAA. La Junta de Calidad Ambiental (JCA) tendrá disponibles para el público el proyecto del Plan Estatal y las disposiciones reglamentarias para implementar las Guías de Emisiones y proveer oportunidad de participación pública antes de someterlo a la EPA.

La Junta de Gobierno de la JCA considerará los comentarios durante el periodo de participación pública y procederá a la aprobación, modificación o desaprobarción del Plan Estatal y las disposiciones reglamentarias. En el caso de su aprobación, la JCA procederá a someterlo a la EPA. La EPA entonces aprobará o desaprobará dicho Plan dentro del término establecido en el CAA. La aprobación o desaprobarción será publicada en el Registro Federal. Si el Gobierno de Puerto Rico, a través de la JCA, no sometiera un Plan Estatal aprobable, entonces la EPA adoptará e implementará un Plan Federal.

Participación Pública: Por este medio se notifica al público que el Plan Estatal, las disposiciones reglamentarias y el proyecto de documentos que lo acompañan se encuentran disponibles para inspección general en el Aseo de Puerto Rico, Oficina de Asesoría Ambiental, Avenida Ponce de León 431, Edificio Nacional Plaza, Octavo Piso, Hato Rey, Puerto Rico. Cualquier comentario con relación a estos documentos deberá someterse por escrito dentro de los treinta (30) días de la fecha de publicación de este Aviso Público a: Oficina de Asesoría Ambiental/Junta de Calidad Ambiental, Apartado 11488, Santurce Station, Santurce, Puerto Rico 00910.

Se celebrará una Vista Pública para recibir exposiciones orales el día 12 de septiembre de 2000, a las 9:00 a.m. La Junta de Gobierno se celebrará en el Salón de Vistas Públicas de la Junta de Calidad Ambiental, según sea el Edificio Nacional Plaza, Hato Rey, Puerto Rico. Toda persona que desee solicitar un turno para dicha Vista deberá hacerlo por escrito por lo menos cinco (5) días antes de la misma. Dichas vistas serán presididas por un Panel Examinador, el cual tendrá su recomendación final con relación al Plan Estatal y a la reglamentación al respecto a la Junta de Gobierno expresada una Resolución modificando su decisión final.

Cualquier persona que desee oponerse a la decisión final o la reglamentación a la que la Junta de Gobierno de la Junta de Calidad Ambiental le imponga su aprobación final podrá solicitar reconsideración en los próximos veinte (20) días desde la fecha de aprobación mediante solicitud escrita, en triplicado, y debidamente fundamentada dirigida al Ldo. Hector Rouse Martínez, Presidente, Junta de Gobierno, Junta de Calidad Ambiental, Apartado 11488, Santurce Station, Santurce, Puerto Rico, 00910.

Por: Hector Rouse Martínez
Presidente

Este Aviso Público se emite en conformidad con el Artículo 14(f) de la Ley sobre Política Pública (Ley 97/1970) y la Sección 2.1 de la Ley de Procedimientos Administrativos Uniformes de Puerto Rico (Ley 170/1988). Aprobado por la Comisión Ejecutiva de Bioseguridad.

JUNTA DE CALIDAD AMBIENTAL/OFICINA DEL GOBERNADOR



AVISO AMBIENTAL INTENCION DE ADOPTAR LAS GUIAS DE EMISION PARA VERTEDEROS DE DESPERDICIOS SOLIDOS MUNICIPALES Y PROMULGAR LAS DISPOSICIONES DE REGLAMENTARIAS PARA IMPLANTAR LAS GUIAS

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