Injection	Area Count	
3	43822	X=44040.1
4	44062	SD=852.5
6	42724	CV=0.019

8.2. Pooled coefficient of variation—Bulk Samples. The pooled coefficient of variation for the analytical procedure was determined by 50 µl replicate injections of analytical standards. The standards were 0.01, 0.02, 0.04, 0.10, 1.0, and 2.0% benzene by volume.

AREA COUNT (PERCENT)

Injection #	0.01	0.02	0.04	0.10	1.0	2.0
1	45386	84737	166097	448497	4395380	9339150
2	44241	84300	170832	441299	4590800	9484900
3	43822	83835	164160	443719	4593200	9557580
4	44062	84381	164445	444842	4642350	9677060
5	44006	83012	168398	442564	4646430	9766240
6	42724	81957	173002	443975	4646260	
X=	44040.1	83703.6	167872	444149	4585767	9564986
SD=	852.5	1042.2	3589.8	2459.1	96839.3	166233
CV=	0.0194	0.0125	0.0213	0.0055	0.0211	0.0174
CV=0.017.						

APPENDIX E TO SUBPART C TO PART 197—RESPIRATOR FIT TESTS

PROCEDURES

This appendix contains the procedures for properly fitting a respirator to employees who may be exposed to benzene and includes the Initial Fit Tests (IFT), the Qualitative Fit Tests (QLFT), and the Quantitative Fit Test (QNFT).

Note that respirators (negative pressure or positive pressure) must not be worn when conditions prevent a tight seal between the faceplate and the skin or the proper functioning of the inhalation or exhalation valves. In order for a respirator to protect the wearer, the facepiece must make a proper seal against the wearer's face. Several factors can negatively affect the respirator to face seal and reduce the level of protection afforded by the respirator. Among these are facial shape, temple pieces of eyeglasses, facial abnormalities (e.g., scars and indentations) absence of dentures, hair style or length of hair, specific skin conditions, and facial hair. Therefore, nothing can come between or otherwise interfere with the sealing surface of the respirator and the face or interfere with the function of the inhalation or exhalation valves.

I. Initial Fit Tests (IFT)

(a) The test subject must be allowed to select the most comfortable respirator from a selection of respirators of various sizes. The selection must include at least three sizes of elastomeric facepieces for the type of respirator that is to be tested (*i.e.*, three sizes of half mask or three sizes of full facepiece).

(b) Before the selection process, the test subject must be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine a comfortable fit. A mirror must be available to assist the subject in evaluating the fit and positioning the respirator. This instruction is only a preliminary review and must not constitute the subject's formal training on respirator use.

(c) The test subject must be informed that he or she is being asked to select the respirator which provides the most comfortable fit. Each respirator represents a different size and shape and, if fitted and used properly, should provide adequate protection.

(d) The test subject must be instructed to hold each facepiece up to the face and eliminate those facepieces which obviously do not give a comfortable fit.

(e) The more comfortable facepieces must be noted and the most comfortable mask donned and worn at least five minutes to assess comfort. Assistance in assessing comfort may be given by discussing the points in section I(f) of this appendix. If the test subject is not familiar with using a particular respirator, the test subject must be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

(f) Assessment of comfort must include reviewing the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

(1) Position of the mask on the nose.

(2) Room for eye protection.

(3) Room to talk.

(4) Position of mask on face and cheeks.

(g) The following criteria must be used to help determine the adequacy of the respirator fit:

(1) Chin properly placed.

(2) Adequate strap tension, not overly tightened.

(3) Fit across nose bridge.

(4) Respirator of proper size to span distance from nose to chin.

(5) Tendency of respirator to slip.

(6) Self-observation in mirror to evaluate fit and respirator position.

(h) The following negative and positive pressure fit tests must be conducted. Before conducting a negative or positive pressure fit test, the subject must be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths Another facepiece must be selected and retested if the test subject fails the fit check tests.

(1) *Positive pressure fit test.* The exhalation valve must be closed off and the subject must exhale gently onto the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

(2) *Negative pressure fit test.* The inlet opening of the canister or cartridge(s) must be closed off by covering with the palm of the hand(s) or by replacing the filter seal(s). The subject must inhale gently so that the facepiece collapses slightly and hold his or her breath for ten seconds. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

(i) The test must not be conducted if the subject has any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, or long sideburns which cross the respirator sealing surface. Any type of apparel, such as a skull cap or the temple bars of eye glasses, which projects under the facepiece or otherwise interferes with a satisfactory fit must be altered or removed.

(j) If the test subject exhibits difficulty in breathing during the tests, the subject must be referred to a physician trained in respiratory disease or pulmonary medicine to determine whether the test subject can wear a respirator while performing his or her duties.

(k) The test subject must be given the opportunity to wear the successfully fitted respirator for a period of two weeks. If at any time during this period the respirator becomes uncomfortable, the test subject must be given the opportunity to select a different facepiece and to be retested.

(l) Exercise regimen. Before beginning the fit test, the test subject must be given a description of the fit test and of the test subject's responsibilities during the test procedure. The description of the process must include a description of the test exercises that the subject must perform. The respirator to be tested must be worn for at least five minutes before the start of the fit test.

(m) Test Exercises. The test subject must perform the following exercises in the test environment:

(1) Normal breathing. In a normal standing position, without talking, the subject must breathe normally.

(2) Deep breathing. In a normal standing position, the subject must breathe slowly and deeply, taking caution so as to not hyperventilate.

(3) Turning head side to side. Standing in place, the subject must slowly turn his or her head from side to side between the extreme positions on each side. The subject must hold his or her head at each extreme momentarily and inhale.

(4) Moving head up and down. Standing in place, the subject must slowly move his or her head up and down. The subject must be instructed to inhale in the up position (*i.e.*, when looking toward the ceiling).

(5) Talking. The subject must talk slowly and loudly enough so as to be heard clearly by the test conductor. The subject must count backward from 100, recite a memorized poem or song, or read the following passage:

RAINBOW PASSAGE

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject must grimace by smiling or frowning.

(7) Bending over. The test subject must bend at the waist as if to touch the toes or, for test environments such as shroud type QNFT units which prohibit bending at the waist, the subject must jog in place.

(8) Normal breathing. Same as exercise 1.

Each test exercise must be performed for one minute, except for the grimace exercise which must be performed for 15 seconds. The test subject must be questioned by the test conductor regarding the comfort of the respirator upon completion of test exercises. If it has become uncomfortable, another respirator must be tried and the subject retested.

(n) The employer shall certify that a successful fit test has been administered to the test subject. The certification must include the following information:

(1) Name of employee.

(2) Type, brand, and size of respirator.

(3) Date of test.

Where QNFT is used, the fit factor, strip chart, or other recording of the results of the

test must be retained with the certification. The certification must be maintained until the next fit test is administered.

II. Qualitative Fit Tests (QLFT)

(a) *General.* (1) The employer shall designate specific individuals to administer the respirator qualitative fit test program. The employer may contract for these services.

(2) The employer shall ensure that persons administering QLFT are able to properly prepare test solutions, calibrate equipment, perform tests, recognize invalid tests, and determine whether the test equipment is in proper working order.

(3) The employer shall ensure that QLFT equipment is kept clean and maintained so as to operate at the parameters for which it was designed.

(b) *Isoamyl acetate tests.* (1) Odor threshold screening test. The odor threshold screening test, performed without wearing a respirator, is intended to determine if the test subject can detect the odor of isoamyl acetate.

(i) Three one-liter glass jars with metal lids must be used.

(ii) Odor free water (e.g. distilled or spring water) at approximately 25 degrees C must be used for the solutions.

(iii) An isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution must be prepared by adding one cc of pure IAA to 800 cc of odor free water in a one liter jar and by shaking the jar for 30 seconds. A new solution must be prepared at least weekly.

(iv) The screening test must be conducted in a room separate from the room used for actual fit testing. The two rooms must be well ventilated but not connected to the same recirculating ventilation system.

(v) An odor test solution must be prepared in a second one-liter jar by placing 0.4 cc of the stock solution into 500 cc of odor free water using a clean dropper or pipette. The solution must be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution must be used for only one day.

(vi) A test blank must be prepared in a third one-liter jar by adding 500 cc of odor free water.

(vii) The odor test jar and the test blank jar must be labeled ''1'' and ''2'' for identification. The labels must be placed on the jar lids so that the labels can be periodically peeled off dried, and switched to maintain the integrity of the test.

(viii) The following instruction must be typed on a card and placed on a table in front of the odor test jar and the test blank jar:

The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil.

(ix) The mixtures in the jars used in the IAA odor threshold screening must be prepared in an area separate from the test area, in order to prevent olfactory fatigue in the test subject.

(x) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test must not be performed.

(xi) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(2) Isoamyl acetate fit test. (i) The fit test chamber must be a clear 55-gallon drum liner or similar device suspended inverted over a two foot diameter frame so that the top of the chamber is about six inches above the test subject's head. The inside top center of the chamber must have a small hook attached.

(ii) Each respirator used for the fitting and fit testing must be equipped with organic vapor cartridges or offer protection against organic vapors. The cartridges or masks must be changed at least weekly.

(iii) After selecting, donning, and properly adjusting a respirator, the test subject must wear the respirator to the fit testing room. This room must be separate from the room used for odor threshold screening and respirator selection and must be well ventilated by an exhaust fan, lab hood, or other device to prevent general room contamination.

(iv) A copy of the test exercises and any prepared text from which the subject is to read must be taped to the inside of the test chamber.

(v) Upon entering the test chamber, the test subject must be given a six inch by five inch piece of paper towel or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 cc of pure IAA. The test subject must hang the wet towel on the hook at the top of the chamber.

(vi) Two minutes must be allowed for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject, to explain the fit test, the importance of the subject's cooperation, and the purpose for the head exercises, or to demonstrate some of the exercises.

(vii) The test subject must be instructed to perform the exercises described in section I(n) of this appendix. If at any time during the test the subject detects the banana like odor of IAA, the test is failed. The subject must be removed quickly from the test

chamber and the test area to avoid olfactory fatigue.

(viii) If the test is failed, the subject must return to the selection room, remove the respirator, repeat the odor sensitivity test, select and don another respirator, return to the test chamber, and again take the IAA fit test. The process must continue until a respirator that fits well is found. If the odor sensitivity test is failed, the subject must wait at least five minutes before retesting to allow odor sensitivity to return.

(ix) When a respirator is found that passes the test, the subject must demonstrate the efficiency of the respirator by breaking the face seal and taking a breath before exiting the chamber. If the subject cannot detect the odor of IAA, the test is deemed inconclusive and must be rerun.

(x) When the test subject leaves the chamber, the subject must remove the saturated towel and return it to the person conducting the test. To keep the test area from becoming contaminated, the used towel must be kept in a self-sealing bag to avoid significant IAA concentration build-up in the test chamber for subsequent tests.

(c) *Saccharin solution aerosol test.* The saccharin solution aerosol test is an alternative qualitative test. Although it is the only validated test currently available for use with particulate disposable dust respirators not equipped with high-efficiency filters, it may also be used for testing other respirators. The entire screening and testing procedure must be explained to the test subject before the conduct of the saccharin test threshold screening test.

(1) Saccharin taste threshold screening test. The test, performed without wearing a respirator, is intended to determine whether the test subject can detect the taste of saccharin.

(i) The subject must wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear. If the enclosure is also used for the saccharin solution aerosol fit test in compliance with section II(c)(2) of this appendix, the enclosure must allow free movements of the head when a respirator is worn. An enclosure substantially similar to the Minnesota, Mining and Manufacturing (3M) hood assembly, parts No. FT 14 and No. FT 15 combined, is adequate.

(ii) The test enclosure must have a ¾ inch hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(iii) The test subject must don the test enclosure. Throughout the threshold screening test, the test subject must breathe with mouth wide open and tongue extended.

(iv) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer, the test conductor must spray the threshold check solution in accordance with II(c)(1)(v) of this appendix into the enclosure. The nebulizer must be clearly marked to distinguish it from the fit test solution nebulizer.

(v) The threshold check solution consists of 0.83 grams of sodium saccharin USP in one cc of warm water. It may be prepared by putting one cc of the fit test solution (see section II(c)(2)(iv) of this appendix) in 100 cc of distilled water.

(vi) To produce the aerosol, the nebulizer bulb must be firmly squeezed so that it collapses completely. Then, the bulb must be released and allowed to expand fully.

(vii) The bulb must be squeezed rapidly ten times and the test subject must be asked whether he or she tastes the saccharin.

(viii) If the first response is negative, the ten rapid squeezes must be repeated and the test subject is again asked whether he or she tastes the saccharin.

(ix) If the second response is negative, ten more squeezes are repeated rapidly and the test subject again asked whether the saccharin is tasted.

(x) The test conductor must take note of the number of squeezes required to solicit a taste response.

(xi) If the saccharin is not tasted after 30 squeezes, the test subject may not perform the saccharin fit test.

(xii) If a taste response is elicited, the test subject must be asked to take note of the taste for reference in the fit test.

(xiii) Correct use of the nebulizer means that approximately one cc of liquid is used at a time in the nebulizer body.

(xiv) The nebulizer must be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four-hours.

(2) Saccharin solution aerosol fit test. (i) The test subject may not eat, drink (except plain water), or chew gum for 15 minutes before the test.

(ii) The fit test must be conducted with the same type of enclosure used for the saccharin taste threshold screening test in accordance with section II(c)(1) of this appendix.

(iii) The test subject must don the enclosure while wearing the respirator selected in the saccharin taste threshold screening test. The respirator must be properly adjusted and equipped with a particulate filter(s).

(iv) A second DeVilbiss Model 40 Inhalation Medication Nebulizer must be used to spray the fit test solution into the enclosure. This nebulizer must be clearly marked to distinguish it from the nebulizer used for the threshold check solution in accordance with section II(c)(1)(iv) of this appendix.

(v) The fit test solution must be prepared by adding 83 grams of sodium saccharin to 100 cc of warm water.

(vi) The test subject must breathe with mouth wide open and tongue extended.

(vii) The nebulizer must be inserted into the hole in the front of the enclosure and the fit test solution must be sprayed into the enclosure using the same number of squeezes required to elicit a taste response in the screening test in accordance with sections II(c)(1)(vi) through II(c)(1)(xi) of this appendix.

(viii) After generating the aerosol, the test subject must be instructed to perform the exercises in section I(n) of this appendix.

(ix) Every 30 seconds, the aerosol concentration must be replenished using one half the number of squeezes used initially.

(x) The test subject must indicate to the test conductor if, at any time during the fit test, the taste of saccharin is detected.

(xi) If the taste of saccharin is detected, the fit must be deemed unsatisfactory and a different respirator must be tried.

(d) *Irritant fume test.* The irritant fume test is an alternative qualitative fit test.

(1) The respirator to be tested must be equipped with high-efficiency particulate air (HEPA) filters.

(2) The test subject must be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with the smoke's characteristic odor.

(3) Both ends of a ventilation smoke tube containing stannic oxychloride, such as the Marine Safety Appliance part No. 5645 or equivalent, must be broken. One end of the smoke tube must be attached to a low flow air pump set to deliver 200 milliliters per minute.

(4) The test subject must be advised that the smoke may be irritating to the eyes and that the subject must keep his or her eyes closed while the test is performed.

(5) The test conductor must direct the stream of irritant smoke from the smoke tube towards the face seal area of the test subject. The test must be started with the smoke tube at least 12 inches from the facepiece, moved gradually to within one inch, and moved around the whole perimeter of the mask

(6) Each test subject who passes the smoke test without evidence of a response must be given a sensitivity check of the smoke from the same tube once the respirator has been removed. This check is necessary to determine whether the test subject reacts to the smoke. Failure to evoke a response voids the fit test.

(7) The fit test must be performed in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by the irritant smoke.

III. Quantitative Fit Tests (ONFT)

(a) *General.* (1) The employer shall designate specific individuals to administer the respirator quantitative fit test program.

(2) The employer shall ensure that persons administering QNFT are able to properly calibrate equipment, perform tests, recognize invalid tests, calculate fit factors, and determine whether the test equipment is in proper working order.

(3) The employer shall ensure that QNFT equipment is kept clean and maintained so as to operate at the parameters for which it was designed.

(b) *Definitions.* (1) *Quantitative fit test* means a test which is performed in a test chamber and in which the normal air-purifying element of the respirator is replaced with a high-efficiency particulate air (HEPA) filter, in the case of particulate QNFT aerosols, or with a sorbent offering contaminant penetration protection equivalent to high-efficiency filters, if the QNFT test agent is a gas or vapor.

(2) *Challenge agent* means the aerosol, gas, or vapor introduced into a test chamber so that its concentration inside and outside of the respirator may be measured.

(3) *Test subject* means the person wearing the respirator for quantitative fit testing.

(4) *Normal standing position* means an erect and straight stance with arms down along the sides and eyes looking straight ahead.

(5) *Maximum peak penetration method* means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

(6) *Average peak penetration method* means the method of determining test agent penetration into the respirator by using a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph, or by computer integration, for each exercise except the grimace exercise. Integrators or computers which calculate the actual test agent penetration into the respirator for each exercise also may be used in accordance with this method.

(7) *Fit factor* means the ratio of challenge agent concentration outside with respect to the inside of a respirator inlet covering (facepiece or enclosure).

(c) *Apparatus.* (1) Instrumentation. Aerosol generation, dilution, and measurement systems using corn oil or sodium chloride as test aerosols must be used for quantitative fit testing.

(2) Test chamber. The test chamber must be large enough to permit all test subjects to perform freely all required exercises without disturbing the challenge agent concentration or the measurement apparatus. The test chamber must be equipped and constructed so that the challenge agent is effectively isolated from the ambient air, yet is uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element must be replaced with a high-efficiency particulate filter supplied by the same manufacturer.

(4) The sampling instrument must be selected so that a strip chart record may be made of the test showing the rise and fall of the challenge agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers which integrate the amount of test agent penetration leakage into the respirator for each exercise may be used if a record of the readings is made.

(5) The combination of substitute air-purifying elements, challenge agent, and challenge agent concentration in the test chamber must be such that the test subject is not exposed to a concentration of the challenge agent in excess of the established exposure limit for the challenge agent at any time during the testing process.

(6) The sampling port on the test specimen respirator must be placed and constructed so that no leakage occurs around the port (e.g. where the respirator is probed), so that a free air flow is allowed into the sampling line at all times, and so that there is no interference with the fit or performance of the respirator.

(7) The test chamber and test set up must permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the challenge atmosphere must maintain a constant concentration of challenge agent inside the test chamber to within a ten percent variation for the duration of the test.

(9) The time lag (*i.e.*, the interval between an event and the recording of the event on the strip chart, computer, or integrator) must be kept to a minimum. There must be a clear association between the occurrence of an event inside the test chamber and the recording of that event.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port must be of equal diameter and of the same material. The length of the two lines must be equal.

(11) The exhaust flow from the test chamber must pass through a high-efficiency filter before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber must not exceed 50 percent.

(13) The limitations of instrument detection must be taken into account when determining the fit factor.

(14) Test respirators must be maintained in proper working order and inspected for deficiencies, such as cracks, missing valves, and gaskets.

(d) *Procedural requirements.* (1) When performing the initial positive or negative pressure test, the sampling line must be crimped closed in order to avoid air pressure leakage during either of these tests.

(2) In order to reduce the amount of QNFT time, an abbreviated screening isoamyl acetate test or irritant fume test may be used in order to quickly identify poor fitting respirators which passed the positive or negative pressure test. When performing a screening isoamyl acetate test, combination high-efficiency organic vapor cartridges or canisters must be used.

(3) A reasonably stable challenge agent concentration must be measured in the test chamber before testing. For canopy or shower curtain type of test units, the determination of the challenge agent stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the challenge agent concentration inside the respirator must be measured to ensure that the peak penetration does not exceed five percent for a half mask or one percent for a full facepiece respirator.

(5) A stable challenge concentration must be obtained before the actual start of testing.

(6) Respirator restraining straps must not be overtightened for testing. The straps must be adjusted by the wearer without assistance from other persons to give a fit reasonably comfortable for normal use.

(7) After obtaining a stable challenge concentration, the test subject must be instructed to perform the exercises described in section I(n) of this appendix. The test must be terminated whenever any single peak penetration exceeds five percent for half masks and one percent for full facepiece respirators. The test subject must be refitted and retested. If two of the three required tests are terminated, the fit is deemed inadequate.

(8) In order to successfully complete a QNFT, three successful fit tests must be conducted. The results of each of the three independent fit tests must exceed the minimum fit factor needed for the class of respirator (e.g., half mask respirator, full facepiece respirator).

(9) Calculation of fit factors. (i) The fit factor must be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration inside the respirator.

(ii) The average test chamber concentration is the arithmetic average of the test chamber concentration at the beginning and of the end of the test.

(iii) The concentration of the challenge agent inside the respirator must be determined by one of the following methods:

(A) Average peak concentration.

(B) Maximum peak concentration.

(C) Integration by calculation of the area under the individual peak for each exercise. This includes computerized integration.

(10) Interpretation of test results. The fit factor established by the quantitative fit testing must be the lowest of the three fit factor values calculated from the three required fit tests.

(11) The test subject must not be permitted to wear a half mask or a full facepiece respirator unless a minimum fit factor equivalent to at least ten times the hazardous exposure level is obtained.

(12) Filters used for quantitative fit testing must be replaced at least weekly, whenever increased breathing resistance is encountered, or whenever the test agent has altered the integrity of the filter media. When used, organic vapor cartridges and canisters must be replaced daily or whenever there is an indication of a breakthrough by a test agent.

APPENDIX F TO SUBPART C TO PART 197—SAMPLE WORKER CERTIFICATION FORM

BENZENE WORKER'S CERTIFICATION

I, _____(Name of worker), certify in accordance with 46 CFR 197.530—

(1) That I have had, within the previous twelve months, at least one medical examination in compliance with 46 CFR 197.560 or 29 CFR 1910.1028;

(2) That the physician conducting the latest medical examination in compliance with paragraph (1) of this certification did not recommend that I be excluded from areas where personal exposure may exceed the action level as defined in 46 CFR 197.505;

(3) That all respirators and personal protective clothing and equipment that I will use while on the vessel meet the requirements of 46 CFR 197.550(b) and 197.555(c) or of 29 CFR 1910.1028; and

(4) That all respirators that I will use while on the vessel have been fitted and fit tested in accordance with 46 CFR 197.550 (c) and (d) or with 29 CFR 1910.1028.

_____

(signature of worker)

_____

(printed name of worker)

_____

(date signed by worker)

APPENDIX A TO PART 197—AIR NO-DECOMPRESSION LIMITS

The following table gives the depth versus bottom time limits for single, no-decompression, air dives made within any 12-hour period. The limit is the maximum bottom time in minutes that a diver can spend at that depth without requiring decompression beyond that provided by a normal ascent rate of 60 fsw per minute. (Although bottom time is concluded when ascent begins, a slower ascent rate would increase the bottom time thereby requiring decompression.) An amount of nitrogen remains in the tissues of a diver after any air dive, regardless of whether the dive was a decompression or no-decompression dive. Whenever another dive is made within a 12-hour period, the nitrogen remaining in the blood and body tissues of the diver must be considered when calculating his decompression.

AIR NO-DECOMPRESSION LIMITS

Depth (feet):	*No-decompression limits (minutes)*
35	310
40	200
50	100
60	60
70	50
80	40
90	30
100	25
110	20
120	15
130	10

(Source: U.S. Navy Diving Manual, 1 September 1973.)

PART 198 [RESERVED]