

**DEPARTMENT OF JUSTICE****28 CFR Part 79**

[Docket No. CIV101F; AG Order No. 2711–2004]

RIN 1105–AA75

**Civil Division; Claims Under the Radiation Exposure Compensation Act Amendments of 2000; Amendments Contained in the 21st Century Department of Justice Appropriations Authorization Act of 2002**

**AGENCY:** Civil Division, Department of Justice.

**ACTION:** Final rule.

**SUMMARY:** The Department of Justice (“the Department”) revises its existing regulations implementing the Radiation Exposure Compensation Act (“the Act” or “RECA”), to reflect changes to RECA contained in two legislative enactments: the Radiation Exposure Compensation Act Amendments of 2000 (“2000 Amendments”), enacted on July 10, 2000; and the 21st Century Department of Justice Appropriations Authorization Act (“Appropriations Authorization Act”), enacted on November 2, 2002.

After enactment of the 2000 Amendments, the Department published two related rulemakings in the **Federal Register** to implement the legislation. The first, a final rule published on August 7, 2002, reflected technical changes to the Act made by the 2000 Amendments. The second, also published on August 7, 2002, was a proposed rule implementing those changes in the 2000 Amendments that required public notice and comment. Since publication of these two rulemakings, the Appropriations Authorization Act was passed; that legislation required modification to both the final and proposed rules. Therefore, this rulemaking accomplishes two essential tasks: discusses comments received regarding the “proposed” rule and reflects relevant changes made by the Department in connection with those comments; and incorporates technical revisions to the rule in order to implement the Appropriations Authorization Act.

**DATES:** Effective date: April 22, 2004. This final rule will apply to all claims pending with the Radiation Exposure Compensation Act Program (“Program”) as of this date.

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**SUPPLEMENTARY INFORMATION:**

**Background**

On July 10, 2000, the RECA Amendments of 2000 were enacted, providing expanded coverage to individuals who developed one of the diseases specified in the Act following exposure to radiation related to the Federal Government’s atmospheric nuclear weapons program or as a result of employment in the uranium production industry. Pub. L. 106–245. On August 7, 2002, the Attorney General published two related rulemakings implementing the 2000 Amendments: (1) A final rule (67 FR 51422) adopting the technical revisions contained in the 2000 Amendments by providing conforming amendments that incorporated the legislative language; and (2) a proposed rulemaking (67 FR 51440) setting forth amendments that primarily addressed compensation for two new claimant categories: uranium millers and individuals employed in the transport of uranium ore or vanadium-uranium ore. Comments were received over a period of 60 days, ending on October 7, 2002. In response to several requests from the public for additional time, the comment period was reopened on November 27, 2002, for an additional 60-day period ending on January 27, 2003.

On November 2, 2002, the President signed the 21st Century Department of Justice Appropriations Authorization Act, Pub. L. 107–273. Section 11007 of the Act makes additional changes to RECA that include: re-inserting a “downwinder” area; clarifying the medical eligibility criteria; providing an alternative radiation exposure standard for uranium miners; and correcting drafting errors contained in the 2000 Amendments.

Accordingly, in conjunction with the comments received on the proposed rule, this rulemaking: describes the expanded population of eligible uranium mine workers created by lowering the radiation exposure threshold for miners; identifies the new uranium worker states; includes provisions for compensation to “aboveground” miners; sets forth employment eligibility criteria for the new claimant categories (millers and ore transporters); describes the documentation required to establish proof of employment in a uranium mine or mill or as an ore transporter; describes the medical documentation necessary to establish the existence of renal cancer and chronic renal disease; and revises the provision concerning attorney representation of claimants before the Department of Justice with respect to claims brought under the Act.

Also, in order to implement the technical changes contained in the Appropriations Authorization Act, this rule incorporates the following revisions to the regulation: inserts a portion of Mohave County, Arizona, previously covered under RECA and erroneously stricken from the 2000 Amendments, as a radiation-affected area for “downwinder” claimants; clarifies the requirement that lung cancer be “primary” for all claimant categories; adds a duration of employment standard as an alternative to a minimum radiation exposure standard for uranium miners; amends the documentation required to establish lung cancer for uranium miner, miller, and ore transporter claimants; and makes other minor revisions consistent with the Appropriations Authorization Act.

**Discussion of Changes and Comments Related to the 2000 Amendments**

Following publication of the proposed regulations, the Department received nearly 50 letters, some containing more than one comment regarding the proposed amendments. Commenters included both interested individuals and organizations. Most of the comments were positive, supporting the proposed changes, and praising what one commenter asserted was the Department’s “thoughtful” approach. Other commenters suggested changes to medical provisions that were subsequently amended by enactment of the Appropriations Authorization Act. Specifically, these commenters noted that the medical criteria for establishing a diagnosis of lung cancer required the submission of documentation relevant to establishing a different type of illness, namely, a nonmalignant respiratory disease. Furthermore, some commenters requested clarification on whether a diagnosis of “lung cancer” (added by the 2000 Amendments as one of the new specified diseases for downwinders and onsite participants) must be “primary” in order to establish eligibility for compensation. Again, the Appropriations Authorization Act addressed this issue and clarified that a diagnosis of “lung cancer” must be “primary” in order to establish eligibility for compensation. Lastly, several commenters requested other technical changes that have subsequently been remedied by enactment of the Appropriations Authorization Act, or were contained in the 2000 Amendments.

The Department carefully reviewed all of the comments, several of which resulted in changes to the proposed rule. Some of the comments requested edits to the text for purposes of

clarification; other suggested changes were more substantive. For example, comments submitted by the National Institute for Occupational Safety and Health (NIOSH), relating to the interpretation of pulmonary function tests (PFTs) for purposes of establishing a diagnosis of a nonmalignant respiratory disease, have prompted two substantive changes in the final rule. These changes will bring the PFT testing criteria in step with the guidelines provided by the American Thoracic Society as set forth in its most recent publication "Lung Function Testing: Selection of Reference Values and Interpretative Strategies." The Department is certain these changes will ensure a more equitable treatment of claims in a manner consistent with current scientific standards.

In regard to other substantive changes, the Department met with two renal specialists to discuss the diagnostic criteria claimants are required to satisfy to prove chronic renal disease. The physicians reviewed the proposed criteria, made suggestions, provided guidance, and shared their specialized expertise in this area. In addition, they provided useful medical and scientific information. The final rule reflects many of the recommendations of those specialists as well as suggestions received by several commenters.

Below are summaries and discussions of the comments received related to the proposed regulations, which have been organized according to content. Minor or technical issues are not discussed.

In some cases, commenters suggested that the Department incorporate certain regulatory provisions that would alter statutory requirements relating to the criteria for compensation. For example, several commenters suggested that the regulations include additional compensable diseases and illnesses. Some argued that the covered illnesses for uranium millers and ore transporters should be identical to those illnesses specified for uranium miners. The regulations, however, cannot expand upon the list of diseases set forth in the statute. With respect to those comments requesting changes that would require legislative modification, the Department has no discretion in the matter. The implementing regulations must reflect the statutory limitations. Stated simply, the Department cannot modify a statute by regulation.

#### Subpart E—Uranium Miners

##### Section 79.40 Scope of Subpart

Several commenters requested that the "exploratory stage of uranium mining" be included for compensation

and that the scope of the subpart therefore be broadened to include "exploratory drillers" or "core drillers." Under the Act's uranium miner provisions, compensation is available to an "individual . . . employed in a uranium mine . . . and [who] was a miner exposed to at least 40 or more working level months of radiation or worked for at least 1 year during the [designated time] period." 42 U.S.C. 2210 (note), Sec. 5(a)(1). The first issue to consider is whether core drillers were "employed in a uranium mine." The Act defines a uranium mine as any "underground excavation . . . or other aboveground mines, where uranium ore or vanadium-uranium ore was mined or otherwise extracted." *Id.* at Sec. 5(b)(7). Core drillers, however, did not work "in" uranium mines so much as "at" prospective sites where uranium deposits were generally located. The purpose of core drilling was to determine whether uranium ore existed in a given location and to determine whether the content of that ore was metallurgically significant to make it useful or marketable. The intent was not to "mine" the uranium, but to test or sample half-dollar size "cores" for suitable uranium-rich locations. If any ore-rich sites were located, uranium miners could then extract the ore. Some core drillers may never have come into contact with uranium ore. Others who were successful did not typically stay to mine the site. Rather, the core drillers routinely left such sites in order to explore new ones.

The crux of the argument to include core drillers is that they "extracted" ore by drilling core samples from a site, and while not technically "miners," they nonetheless engaged in the same broad type of work (extraction) and should therefore be eligible for compensation.

The Act's provisions, however, require an individual to be "employed in a uranium mine" as a "miner." While the work performed by core drillers was crucial to the success of the uranium production industry, these individuals were not employed in a uranium mine nor were they considered to be miners, and commenters did not generally claim otherwise. For example, one commenter advocating the expansion of this subpart to include core drillers implicitly recognized that core drillers were not employed in a uranium mine when he suggested changing the scope of the subpart to cover those employed "in or around a uranium mine." The plain language of the Act clearly describes the requirements for satisfying the definition of "miner." Extracting uranium ore from within a mine is one

of the strict definitional limits that cannot be expanded by regulation.

For all of these reasons, broadening the scope of this subpart to include "exploratory" work would not be consistent with the terms of the Act. We note, however, that a core driller who is able to establish that he worked "in a uranium mine" as a "miner" may satisfy the eligibility criteria.

##### Section 79.41 Definitions

Section 79.41(d) Fibrosis of the Lung or Pulmonary Fibrosis; See Also 79.51(e), 79.61(f)

One commenter correctly noted that since enactment of the 2000 Amendments, individuals establishing proof of fibrosis of the lung or pulmonary fibrosis are no longer required to demonstrate evidence of "impairment." The definition of "fibrosis of the lung or pulmonary fibrosis" in the proposed rule inadvertently required proof of impairment and this error has been corrected in the final rule.

Prior to the 2000 Amendments, the medical documentation protocol contained in the regulations required the submission of either pulmonary function tests or arterial blood gas studies—both of which demonstrated evidence of impairment. The 2000 Amendments, however, eliminated this requirement. While individuals may provide such evidence, submission of pulmonary function tests or arterial blood gas studies is no longer mandatory. The Act now provides a broader range of diagnostic evidence that individuals may submit to establish the existence of fibrosis of the lung or pulmonary fibrosis. The final rule revises the definition of "fibrosis of the lung or pulmonary fibrosis" accordingly.

##### Section 79.41(m) Uranium Mine

One commenter asked whether compensation was available for those miners who worked aboveground doing tasks such as stock piling ore and operating loaders (dump trucks). Those activities would be considered aboveground mining activities. In the 2000 Amendments, Congress expanded the definition of a uranium mine to include "aboveground" mines. The Department has incorporated this expanded definition into these regulations. Thus, miners employed in aboveground mines may be eligible for compensation so long as they satisfy other eligibility criteria.

Section 79.41(p) Written Diagnosis by a Physician; See Also 79.51(s) and 79.61(s)

One commenter requested clarification regarding the requirement that a physician submitting a written diagnosis of a nonmalignant respiratory disease in the case of a living claimant under § 79.46 must be employed by the Indian Health Service, the Department of Veterans Affairs, or be certified by a state medical board. Specifically, the commenter questions what the phrase “certified by a state medical board” means. There are several tiers of credentials that physicians may acquire. As an initial requirement, physicians practicing in the United States must be licensed by one (or more) states. Licensing requirements are written into state law, and vary slightly from state to state. The Federation of State Medical Boards maintains a listing of every physician’s licensure status. In addition to being a licensed physician, many physicians obtain additional training, typically called “residency,” in a specialized field. After successful completion of a residency training program, and other requirements that vary from one specialty to another, a physician may become “Board Certified” by passing the Board exam in his or her chosen specialty. The Act requires that a written diagnosis of a nonmalignant respiratory disease be made by a “board certified physician.” 42 U.S.C. 2210 (note), Sec. 5(c)(1)(B)(ii). This requirement must, therefore, be satisfied by Board certification in a relevant specialty. The Department has accordingly revised the final rule in order to clarify this requirement and ensure that the regulatory provision is consistent with the Act.

*Section 79.44 Proof of Working Level Month Exposure to Radiation and Proof of Employment for at Least One Year*

One commenter requested that language be inserted in this section to explain that in addition to any other material that may be used to substantiate the claimant’s uranium mining employment history for purposes of determining working level months, an affidavit may be submitted under certain circumstances. While the limited use of affidavits is described in § 79.4, the Department concurs with the commenter and relevant language has been inserted in the regulation under this section.

*Section 79.45 Proof of Lung Cancer*

One commenter noted that the term “primary” had been omitted from this section and requested that it be

reinserted to avoid confusion. The Act defines “lung cancer,” for purposes of subparts E, F, and G, as “any physiological condition of the lung, trachea, or bronchus that is recognized as lung cancer by the National Cancer Institute.” 42 U.S.C. 2210 (note), Sec. 5(b)(6). The National Cancer Institute uses the term “lung cancer” to describe a cancer with a primary origin in the lung. The requested changes to this subsection and several corresponding changes in subparts E, F, and G have been made to clearly reflect the requirement that a diagnosis of primary lung cancer must be established to satisfy the eligibility criteria.

*Section 79.46 Proof of Nonmalignant Respiratory Disease; See Also 79.55 and 79.65*

One commenter suggested inserting the words “reproducible” and “time/volume” in describing the three tracings required on a pulmonary function test. These suggestions are consistent with American Thoracic Society (ATS) standards, and accurately describe the recorded tracings that are required to demonstrate the claimant’s pulmonary function.

The same commenter noticed that the word “restrictive” was added to the descriptions of lung function and pulmonary function tests (PFTs) in all relevant provisions of the regulation. The commenter argues that inclusion of this word would disqualify those claimants filing under the Act’s uranium worker provisions who suffer from “obstructive” lung disease. The addition of the term “restrictive” with respect to lung function was one of the many legislative changes contained in the 2000 Amendments. See 42 U.S.C. 2210 (note), Sec. 5(b)(5)(B)(iv). Its inclusion in the regulation reflects conformity with the Act. That being said, this provision will not result in the disqualification of all claimants diagnosed with obstructive lung disease who may have previously qualified. The measure of a claimant’s “forced expiratory volume in one second” (FEV<sub>1</sub>), which is an indicator of obstructive lung disease, remains one of the testing variables that is used as part of the diagnostic protocol. Additionally, those claimants with obstructive lung disease may submit one of the other forms of medical documentation listed in § 79.46(d)(3)(ii) in lieu of pulmonary function tests.

The National Institute for Occupational Safety and Health (NIOSH) submitted a comment suggesting that the Department discontinue the use of a fixed value (presently 80% of the predicted value)

for determining evidence of restrictive or obstructive lung disease from a pulmonary function test. Instead, NIOSH recommends using the “lower limit of normal,” rather than a fixed percentage of the predicted value, as this would be consistent with the standards articulated by the ATS. Specifically, when determining the existence and severity of impairment from a pulmonary function test, the ATS recommends the use of the lowest 5% of the reference population to establish the lower limit of normal and recommends against using a fixed percentage value. Accordingly, the Department has amended the standard set forth in the regulations at Appendix A, under which a pulmonary function test is determined to be demonstrative of restrictive or obstructive lung disease. This rule, at § 79.46(d)(3)(ii)(D), provides that a forced vital capacity (FVC) or FEV<sub>1</sub> value will be interpreted as demonstrating evidence of restrictive or obstructive lung disease if the value shown is equal to or below the lower limit of normal. The use of the lower limit of normal rather than a fixed percentage value is in keeping with ATS standards and will ensure a more scientifically sound measurement for determining the presence and extent of lung function abnormality demonstrated by pulmonary function testing.

NIOSH also raised concerns regarding use of the specific reference values contained in the pulmonary function tables for determining whether a PFT demonstrates evidence of restrictive lung disease. The Department has been using the predicted spirometry values provided in a study conducted by Knudson, *et al.* “Changes in the Normal Maximal Expiratory Flow-Volume Curve with Growth and Aging.” NIOSH recommends against the continued use of the reference values provided by the Knudson study. These values were developed strictly from Caucasian subjects and did not take into consideration race and ethnicity. Consequently, other ethnic groups, such as Mexican Americans and Native Americans, who have been shown to have different spirometric reference values, are not represented by the Knudson study. NIOSH instead recommends the use of the reference values provided in the study conducted by Hankinson, *et al.* “Spirometric Reference Values from a Sample of the General U.S. Population,” as this study differentiates between reference values for Caucasians, African Americans, and Mexican Americans. This recommendation is consistent with ATS standards. Accordingly, the Department

has amended the pulmonary function tables found at Appendix A to reflect the reference values provided in the Hankinson study.

It is noted, however, that the Hankinson study does not include reference values for Native Americans, an ethnic group that comprises a large percentage of the claimants filing under the uranium worker provisions of the Act. Consequently, the Department has determined that it would be appropriate to incorporate reference values specific to Native Americans in the pulmonary function tables. Scientifically reliable reference values specific to Native Americans may be found in the study conducted by Crapo, *et al.* "Normal Spirometric Values in Healthy American Indians." Accordingly, the pulmonary function tables at Appendix A have been amended to include the reference values found in the Crapo study as well as those found in the Hankinson study. The Department has decided that these changes will provide reference values consistent with ATS's recommendation to consider factors of race and ethnicity.

#### Subpart F—Uranium Millers

##### Section 79.53 Proof of Employment as a Miller

One commenter asserted that the use of affidavits to establish employment as a miller (and as an ore transporter under § 79.63(c)) was included in the 2000 Amendments. The 2000 Amendments, however, only extended the use of affidavits for a limited purpose. The Act provides: "in addition to any other material that may be used to substantiate employment history for purposes of determining working level months, an individual filing a claim under those procedures may make such a substantiation by means of an affidavit described in subparagraph (B)." 42 U.S.C. 2210 (note). This provision does not pertain to millers or ore transporters because such claimants are not required to demonstrate exposure to working level months of radiation. The relevant regulatory provision concerning affidavits (§ 79.4) simply adopts the Act's language regarding the limited submission of affidavits for purposes of determining working level months and, as such, does not permit the use of affidavits by co-workers to substantiate employment as a miller or ore transporter.

##### Section 79.55 Proof of Nonmalignant Respiratory Disease

One commenter, a physician from the Indian Health Service, noted specific concerns found in three identical

provisions at §§ 79.46(d)(3)(ii)(A)(2); 79.55(d)(3)(ii)(A)(2); and 79.65(d)(3)(ii)(A)(2) of the proposed rule. These provisions reflected language contained in the statute at 42 U.S.C. 2210 (note), Sec. 5(c)(2)(B). The statutory provision, although under the heading entitled "Chest x-rays," involved the conclusiveness of evidence that would be afforded to a written diagnosis made by a physician of a nonmalignant respiratory disease. The "Supplementary Information" section of the proposed rule discussed the apparent confusion concerning the Act's text: "The proposed rule does not independently address the provisions concerning conclusive evidence in section 5(c)(2)(B) of the Act, because that section is substantially identical to section 5(c)(1)(B) and appears to have been included in the 2000 Amendments in error. The Department requests public comments on whether the regulations should accord any additional, independent effect to section 5(c)(2)(B)." 67 FR 51441 (Aug. 7, 2002). After further review, the Department has decided to delete those regulatory provisions purporting to implement section 5(c)(2)(B) of the Act. The Department has concluded that section 5(c)(2)(B) of the Act does not relate to the interpretation of chest x-rays and that any attempt to link the statutory provision to chest x-rays would be contrary to the plain meaning of the Act. As described in section 5(b)(5)(B), chest x-rays must be interpreted by a maximum of two NIOSH certified B readers. As such, section 5(c)(2)(B) has no relevance to the interpretation of chest x-rays and is merely repetitive of section 5(c)(1)(B), which addresses the conclusiveness to be afforded a written diagnosis made by a physician.

##### Section 79.57 Proof of Chronic Renal Disease; See Also 79.67

Several commenters noted that the most common cause of chronic renal failure is diabetes. Diabetes occurs in approximately 10% of the entire population; it occurs in approximately 20% to 30% of the Native American population. A commenter from the Indian Health Service noted that the exclusion of diabetic individuals may dramatically affect the population of Navajo patients where the diabetes prevalence is quite high in comparison to Caucasian patients. Other commenters, including one from St. Mary's Saccomanno Research Center, suggested further study of the relationship between diabetes or diabetic nephropathy and chronic renal disease. After further review of this section, the Department has determined

that diabetic claimants should not be treated differently than other claimants for purposes of establishing chronic renal disease. Rather, in evaluating all claims involving chronic renal disease, the Department will examine the relevant medical documentation and evaluate whether claimants developed chronic renal disease following employment as a miller or ore transporter. See §§ 79.52(c) and 79.62(c). Consequently, if any claimant, whether diabetic or not, suffered from chronic renal disease prior to employment as a miller or ore transporter, he or she would not be eligible for compensation.

#### Subpart G—Ore Transporters

##### Section 79.61 Definitions

##### Section 79.61(e) Employment as an Ore Transporter

One commenter argued that all aboveground miners who moved or carried uranium ore at a mine should be considered "ore transporters." The regulations, however, may not collapse separate statutorily designated claimant categories. The statute provides that uranium miners, employed in an aboveground uranium mine, are eligible for compensation. See 42 U.S.C. 2210 (note), Sec. 5(a)(1) and Sec. 5(b)(7). However, the statute requires that, to receive compensation as an ore transporter, an individual must be "employed in the transport of uranium ore or vanadium-uranium ore from such mine or mill." *Id.* at 5(a)(1)(A)(i). It is plain from this language that ore transporters are those individuals who transported ore away from a mine or mill rather than transported ore within a mine or mill. It would be inconsistent with the plain meaning of the Act for every individual who worked aboveground at the mine surface moving or carrying uranium ore to be considered an ore transporter. Consequently, those individuals employed in aboveground uranium mining activities will be considered aboveground miners for purposes of determining eligibility under the Act. Several commenters asked whether mechanics, mine road maintenance workers, and other shop workers would be classified as ore transporters. While the definitions of miner, miller, and ore transporter are drafted broadly, the extension of coverage to mechanics, mine road maintenance workers, and other shop workers would not be consistent with the Act. As reviewed above, ore transporters include individuals "employed in the transport of uranium ore or vanadium-uranium ore" from a mine or mill. See 42 U.S.C. 2210 (note), Sec. 5(a)(1)(A)(i).

### Section 79.74 *Representatives and Fees*

One commenter expressed the view that claimants and beneficiaries should have the "option" of hiring an attorney or filing by themselves. Nothing in the Act or regulations makes attorney representation mandatory. The regulatory provision provides: "In submitting and presenting a claim to the Program, a claimant or beneficiary *may, but need not, be represented* by an attorney or by a representative of an Indian Tribe or tribal organization." § 79.74(a) (emphasis added). In fact, a majority of all claimants do not retain counsel, and most have successfully established their eligibility for compensation. The Program strives to provide assistance to claimants in obtaining documents to establish eligibility criteria.

Another commenter asserted that the monetary penalty of \$5,000 for attorneys who charge in excess of the Act's fee limitations is too low and that such attorneys should also be disqualified from filing RECA claims. The Department notes that the penalty for attorneys who charge in excess of the Act's fee arrangement is specified in Section 9(c) of the Act. The relevant regulatory provision (§ 79.74(b)(3)) merely implements this statutory mandate.

In the event a claimant elects to retain an attorney, it is important to the Department that only duly qualified attorneys be permitted to assist RECA claimants. The attorney must be an active member in good standing of the bar of the highest court of the state, 5 U.S.C. 500(b), which provides assurance that an attorney will be subject to oversight and disciplinary rules that will best guarantee faithful, ethical, and adequate representation of claimants and beneficiaries. In addition, the final regulation requires an attorney to submit a signed representation agreement, retainer agreement, fee agreement, or contract to the Department, authorizing the attorney to represent the claimant or beneficiary and acknowledging that the Act's fee limitations are satisfied.

One commenter stated that the following language from the "Supplementary Information" section of the proposed rule was confusing: "The Department has determined generally not to permit non-attorneys to represent claimants and beneficiaries before the Program." 67 FR 51441 (Aug. 7, 2002). Based on this language, the commenter requested whether he could, as a non-attorney, represent claimants before the Department for RECA benefits. The

Department is of the view that claimants and beneficiaries would be best served by relying on the expertise and legal training of attorneys in cases where such claimants and beneficiaries determine it would be beneficial to use the services of a representative. The Department has revised this section in the final regulation in order to clarify the issue regarding non-attorney representation and the prohibition against permitting non-attorneys to engage in the unauthorized practice of law. The final regulation provides that non-attorneys (other than representatives of an Indian Tribe or tribal organization) are not permitted to represent claimants or beneficiaries before the Program.

Two commenters objected, however, to allowing representatives of an Indian Tribe or tribal organization to assist RECA claimants before the Department. One of the commenters argued that the Department is attempting to regulate non-lawyers, which would be outside the scope of the Act and constitute an inappropriate expansion of the statute. Actually, this exception to the rule prohibiting non-attorneys from representing claimants and beneficiaries before the Department is consistent with the Act's directive, contained in section 6(d)(5), which provides: "*Native American considerations*. Any procedures under this subsection shall take into consideration and incorporate, to the fullest extent feasible, Native American law, tradition, and custom with respect to the submission and processing of claims by Native Americans." Refusing to allow representatives of Indian Tribes and tribal organizations to assist claimants and beneficiaries would fail to recognize the important role such tribal representatives traditionally play in representing claimants. These representatives have specialized knowledge and expertise with respect to the language, culture, and familial relationships of claimants. Such claimants would be unnecessarily disenfranchised without assistance from these representatives. Moreover, these services to members of Indian Tribes are provided by formally constructed organizations of the tribal government. These organizations are accountable to tribal authorities for responsibly fulfilling its duties in assisting claimants.

Another commenter expressed confusion regarding the relevant fee structure when an attorney hires assistants or experts to work on a particular claim or claims. The "Supplementary Information" section at the beginning of the proposed rule

explains: "An attorney representative may hire, and make use of experts, aids, paralegals, and other persons who are not attorneys. The use of such assistants and experts, however, will not affect the fee limitations specified in the Act and in this proposed rule, which establish an overall limitation on the total amount of fees that a representative, along with his or her assistants and experts, may receive." 67 FR 51441 (Aug. 7, 2002). Accordingly, if an attorney is entitled to a 2% fee in the event of a successful claim, then the 2% fee limitation applies to the total amount paid to the attorney and any assistants, such as experts, aids, or paralegals, he or she has hired to work on the claimant's behalf.

Several commenters argued that if "costs" must be absorbed by the attorney, regardless of the claim's outcome, this will have the unintended effect of prohibiting many deserving claimants from being able to document their claims. These commenters proposed that this section be amended so that the statutory fee limitations imposed on the payment that the attorney may receive for services rendered do not apply to reimbursement for certain costs and expenses that the attorney incurs. In particular, commenters urged that certain costs, including those costs incurred to obtain necessary medical testing specified in the Act, be reimbursable to the attorney. They also argued that attorneys will not take claims that may not succeed because they cannot afford to absorb the costs associated with preparing claims that are denied. Finally, the commenters speculated that failure to reimburse costs will result in a reduced number of attorneys willing to assist claimants, which will then create a subsequent increase in the number of denied claims due to lack of proper documentation.

In regard to the issue of costs, the Department gave a great deal of consideration to the arguments asserted. Looking to the Act, section 9(a) provides: "Notwithstanding any contract, the representative of an individual may not receive, for *services rendered* in connection with the claim of an individual under this Act [this note], more than that percentage specified in subsection (b) of a payment made under this Act on such claim." (Emphasis added.) The Department construes the Act's plain language as including costs within the term "services rendered." Because the costs of obtaining records are indispensable to providing legal services for RECA claimants, it is reasonable and practical to consider those costs as part of the "services rendered in connection with a

claim of an individual under this Act.” In determining eligibility, the Department conducts a pure record review of each claim submitted. The process is non-adversarial, there is no formal discovery, nor are there court appearances or other “judicial” procedures involved in pursuing a claim. Obtaining and submitting the documentation necessary to substantiate a claim is a large part of the “service” rendered to a client. Although most attorneys who submit claims perform valuable services, documentation is often gathered by the Department on behalf of claimants even in instances where the claimant *has* attorney representation. In nearly every uranium worker claim, regardless of whether there is attorney representation, the Department reviews the information supplied on the claim form (work history information for uranium worker or onsite participant claimants), then searches its database to confirm an individual’s employment or contacts another agency for verification. For other claims, when a specified cancer diagnosis is reported on the claim form, the Department contacts the relevant state cancer registry to confirm the diagnosis. In some instances, sometimes for valid reason, claims filed by attorneys contain very little supporting documentation. To reimburse attorneys for costs in addition to the maximum statutory attorney fee will reduce the claimant’s share of the award, many times without justification.

With respect to the argument that fewer attorneys will be willing to assist claimants given the limitation on reimbursement of costs, the Department has taken a close look at the actual statistics for claims filed by attorneys under the Act. Since enactment of the 2000 Amendments on July 10, 2000, claims filed by attorneys have decreased by less than 3%, too small an amount from which to infer a reduction in access to legal services. Moreover, the rate of approved claims during this period has increased from approximately 50% to more than 75%, reflecting the elimination of many hurdles to compensation that existed prior to the 2000 Amendments. The Department therefore is not convinced that claimants will be unable to find qualified legal assistance in filing their claims.

The Department has revised § 79.74(b)(3)(ii) of the rule by striking language applying the higher attorney fee limit (10%) to claims administratively appealed to the designated Appeals Officer pursuant to § 79.73 of these regulations. Also stricken is the application of the higher

fee for actions for review filed in United States District Court. It is the Department’s position that the plain meaning of a “resubmission of a denied claim” as provided in section 9(b)(2)(B) of the Act includes only those instances where a claim, previously denied by the Program, is resubmitted or re-filed with the Program. This revision is consistent with section 8(b) of the Act, permitting a claimant who has been denied compensation the opportunity to “resubmit a claim for consideration by the Attorney General in accordance with this Act not more than three times.” Considering both these sections together, the interpretation of the language contained in section 9 is clear. The “resubmission of a denied claim,” for which an attorney would be entitled (if the claim is successful) to the higher attorney fee, is limited specifically to those claims, after having been denied by the Program, that are subsequently re-filed with the Program.

Regarding the text of the rule generally, the Department received other technical or administrative comments suggesting minor edits to the text. These comments were carefully considered and in many instances, the textual edits were adopted. In some cases, however, the Department declined to make the requested edits because they were inconsistent with the terms of the Act.

#### **Discussion of Final Changes Related to the Appropriations Authorization Act**

This rule amends the list of compensable “downwinder” geographical areas to include a portion of Mohave County, Arizona, located north of the Grand Canyon. This geographical area, previously compensable under the original Radiation Exposure Compensation Act, was erroneously stricken as a compensable area under the 2000 Amendments and has been reinserted by the Appropriations Authorization Act.

The rule also clarifies the requirement that lung cancer be “primary” for all claimant categories. The 2000 Amendments added “lung cancer” as a covered disease for downwinder and onsite participant claimants. It was unclear whether this illness had to be diagnosed as “primary” for purposes of compensation of these claimants. The Appropriations Authorization Act clarified this issue by including “lung cancer” within the list of primary cancers for downwinders and onsite participants, the onset of which must have occurred at least five years after first exposure.

In addition, this rule allows a uranium miner to satisfy the radiation exposure requirement by demonstrating at least 12 months of employment in uranium mining as an alternative to satisfying a radiation level exposure standard. The 2000 Amendments added miller and ore transporters as new claimant categories and required that they satisfy a 12-month duration of employment standard; however, the 2000 Amendments did not extend this method of establishing exposure to uranium miners. The Appropriations Authorization Act remedies this disparity among the uranium worker claimants.

This rule also removes the statutory requirement that written medical documentation relevant to establishing a nonmalignant respiratory disease also be provided to establish lung cancer in the case of living claimants. The 2000 Amendments required identical forms of medical evidence to establish proof of a nonmalignant respiratory disease *and* lung cancer. Because of the recognizable differences between these two illnesses, however, it was difficult for those individuals diagnosed with lung cancer to satisfy this requirement. The Appropriations Authorization Act remedies the problem caused by this apparent draftsmanship error and eliminates the requirement that living claimants diagnosed with lung cancer submit the same medical documentation as claimants with a nonmalignant respiratory disease. The rule reflects this change.

Finally, the Appropriations Authorization Act strikes restrictive language requiring new uranium mining states to contain an “Atomic Energy Commission” uranium mine in order to be eligible for coverage; the rule incorporates this change as well.

#### **Regulatory Flexibility Act**

The Attorney General, in accordance with the Regulatory Flexibility Act (5 U.S.C. 605(b)), has reviewed this regulation and by approving it certifies that this regulation will not have a significant economic impact on a substantial number of small entities for the following reason: The claimant population benefited by these regulations is limited to individuals who developed a specified illness following exposure to radiation related to the Federal Government’s atmospheric nuclear weapons program or as a result of employment in the uranium production industry. The regulations set forth eligibility criteria that claimants must satisfy in order to receive compensation. They will have no impact on small businesses.

**Executive Order 12866**

This regulation has been drafted and reviewed in accordance with Executive Order 12866, "Regulatory Planning and Review" section 1(b), Principles of Regulation. The compensation payments provided for by the Radiation Exposure Compensation Act, the 2000 Amendments, and the Appropriations Authorization Act and implemented by this rule will exceed \$100,000,000 a year for several years. Because of the aggregate size of these payments to eligible individuals, the Office of Management and Budget has determined that this rule is "economically significant" as defined by section 3(f)(1) of Executive Order 12866. Accordingly, this rule has been reviewed by OMB.

This rule will not adversely affect the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities. Rather, the RECA system is an administrative compensation program that serves to provide payments to individuals who meet the eligibility requirements of the Act and implementing regulations. Accordingly, qualifying individuals receive monetary compensation for certain diseases they developed following exposure to radiation under the conditions set forth in the rule.

**Executive Order 13132**

This regulation will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 13132, it is determined that this rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

**Executive Order 12988**

This regulation meets the applicable standards set forth in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform.

**Unfunded Mandates Reform Act of 1995**

This rule will not result in the expenditure by state, local, and tribal governments, in the aggregate, or by the private sector, of \$100,000,000 or more in any one year, and it will not significantly or uniquely affect small governments. Therefore, no actions were deemed necessary under the provisions of the Unfunded Mandates Reform Act of 1995.

**Small Business Regulatory Enforcement Fairness Act of 1996**

The compensation payments provided for by the Radiation Exposure Compensation Act, the 2000 Amendments, and the Appropriations Authorization Act and implemented by this rule will exceed \$100,000,000 a year for several years. Because of the aggregate size of these payments to eligible individuals, the Office of Management and Budget has determined that this rule is a "major rule" as defined by section 251 of the Small Business Regulatory Enforcement Fairness Act of 1996, 5 U.S.C. 804.

However, this rule will not result in a major increase in costs or prices or have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based companies to compete with foreign-based companies in domestic and export markets. Rather, the RECA system is an administrative compensation program that serves to provide payments to individuals who meet the eligibility requirements of the Act and implementing regulations. Accordingly, qualifying individuals receive monetary compensation for certain diseases they developed following exposure to radiation under the conditions set forth in the rule.

Further, this rule merely conforms Department regulations to the Appropriations Authorization Act, makes other technical changes, and following a period of public notice and comment, implements the 2000 Amendments with respect to the two new claimant categories. For the foregoing reasons, the Department finds that it would be unnecessary and contrary to the public interest for the effectiveness of this rule to be deferred for the time specified by 5 U.S.C. 801. Accordingly, the Department invokes the exception allowed by 5 U.S.C. 808 and determines that this rule should take effect on April 22, 2004, as set forth above in the **DATES** section.

**Paperwork Reduction Act**

Information collection associated with this regulation has been approved by the Office of Management and Budget under the provisions of the Paperwork Reduction Act of 1995. The OMB control number for this collection is 1105-0052.

**List of Subjects in 28 CFR Part 79**

Administrative practice and procedure, Authority delegations (Government agencies), Cancer, Claims, Radiation Exposure Compensation Act,

Radioactive materials, Reporting and recordkeeping requirements, Uranium, Uranium mining.

■ Accordingly, Part 79 of Chapter I of Title 28 of the Code of Federal Regulations is revised to read as follows:

**PART 79—CLAIMS UNDER THE RADIATION EXPOSURE COMPENSATION ACT****Subpart A—General**

Sec.

- 79.1 Purpose.
- 79.2 General definitions.
- 79.3 Compensable claim categories under the Act.
- 79.4 Determination of claims and affidavits.
- 79.5 Requirements for medical documentation, contemporaneous records, and other records or documents.

**Subpart B—Eligibility Criteria for Claims Relating to Leukemia**

- 79.10 Scope of subpart.
- 79.11 Definitions.
- 79.12 Criteria for eligibility for claims relating to leukemia.
- 79.13 Proof of physical presence for the requisite period and proof of participation onsite during a period of atmospheric nuclear testing.
- 79.14 Proof of initial exposure prior to age 21.
- 79.15 Proof of onset of leukemia more than two years after first exposure.
- 79.16 Proof of medical condition.

**Subpart C—Eligibility Criteria for Claims Relating to Certain Specified Diseases Contracted After Exposure in an Affected Area ("Downwinders")**

- 79.20 Scope of subpart.
- 79.21 Definitions.
- 79.22 Criteria for eligibility for claims relating to certain specified diseases contracted after exposure in an affected area ("downwinders").
- 79.23 Proof of physical presence for the requisite period.
- 79.24 Proof of initial or first exposure after age 20 for claims under § 79.22(b)(1).
- 79.25 Proof of onset of leukemia at least two years after first exposure, and proof of onset of a specified compensable disease more than five years after first exposure.
- 79.26 Proof of medical condition.
- 79.27 Indication of the presence of hepatitis B or cirrhosis.

**Subpart D—Eligibility Criteria for Claims by Onsite Participants**

- 79.30 Scope of subpart.
- 79.31 Definitions.
- 79.32 Criteria for eligibility for claims by onsite participants.
- 79.33 Proof of participation onsite during a period of atmospheric nuclear testing.
- 79.34 Proof of medical condition.
- 79.35 Proof of onset of leukemia at least two years after first exposure, and proof of onset of a specified compensable disease more than five years after first exposure.
- 79.36 Indication of the presence of hepatitis B or cirrhosis.



**Subpart E—Eligibility Criteria for Claims by Uranium Miners**

- 79.40 Scope of subpart.
- 79.41 Definitions.
- 79.42 Criteria for eligibility for claims by miners.
- 79.43 Proof of employment as a miner.
- 79.44 Proof of working level month exposure to radiation.
- 79.45 Proof of primary lung cancer.
- 79.46 Proof of nonmalignant respiratory disease.

**Subpart F—Eligibility Criteria for Claims by Uranium Millers**

- 79.50 Scope of subpart.
- 79.51 Definitions.
- 79.52 Criteria for eligibility for claims by uranium millers.
- 79.53 Proof of employment as a miller.
- 79.54 Proof of primary lung cancer.
- 79.55 Proof of nonmalignant respiratory disease.
- 79.56 Proof of primary renal cancer.
- 79.57 Proof of chronic renal disease.

**Subpart G—Eligibility Criteria for Claims by Ore Transporters**

- 79.60 Scope of subpart.
- 79.61 Definitions.
- 79.62 Criteria for eligibility for claims by ore transporters.
- 79.63 Proof of employment as an ore transporter.
- 79.64 Proof of primary lung cancer.
- 79.65 Proof of nonmalignant respiratory disease.
- 79.66 Proof of primary renal cancer.
- 79.67 Proof of chronic renal disease.

**Subpart H—Procedures**

- 79.70 Attorney General's delegation of authority.
- 79.71 Filing of claims.
- 79.72 Review and resolution of claims.
- 79.73 Appeals procedures.
- 79.74 Representatives and attorney's fees.
- 79.75 Procedures for payment of claims.
- Appendix A to Part 79—FVC and FEV-1 Lower Limits of Normal Values
- Appendix B to Part 79—Blood Gas Study Tables
- Appendix C to Part 79—Radiation Exposure Compensation Act Offset Worksheet—On Site Participants

**Authority:** Secs. 6(a), 6(i) and 6(j), Pub. L. 101–426, 104 Stat. 920, as amended by secs. 3(c)–(h), Pub. L. 106–245, 114 Stat. 501 and sec. 11007, Pub. L. 107–273, 116 Stat. 1758 (42 U.S.C. 2210 note; 5 U.S.C. 500(b)).

**Subpart A—General****§ 79.1 Purpose.**

The purpose of the regulations in this part is to implement the Radiation Exposure Compensation Act (“Act”), as amended by the Radiation Exposure Compensation Act Amendments of 2000 (“2000 Amendments”) and by the 21st Century Department of Justice Appropriations Authorization Act (“Appropriations Authorization Act”). The Act authorizes the Attorney General of the United States to establish

procedures for making certain payments to qualifying individuals who contracted one of the diseases listed in the Act. The amount of each payment and a general statement of the qualifications are indicated in § 79.3(a). The procedures established in this part are designed to utilize existing records so that claims can be resolved in a reliable, objective, and non-adversarial manner, quickly and with little administrative cost to the United States or to the person filing the claim.

**§ 79.2 General definitions.**

(a) *Act* means the Radiation Exposure Compensation Act, Public Law 101–426, as amended by sections 3139 and 3140 of Public Law 101–510, the Radiation Exposure Compensation Act Amendments of 2000, Public Law 106–245 (see 42 U.S.C. 2210 note), and the 21st Century Department of Justice Appropriations Authorization Act, Public Law 107–273.

(b) *Child* means a recognized natural child of the claimant, a stepchild who lived with the claimant in a regular parent-child relationship, or an adopted child of the claimant.

(c) *Claim* means a petition for compensation under the Act filed with the Radiation Exposure Compensation Program by a claimant or by his or her eligible surviving beneficiary or beneficiaries.

(d) *Claimant* means the individual, living or deceased, who is alleged to satisfy the criteria for compensation set forth either in section 4 or in section 5 of the Act.

(e) *Contemporaneous record* means any document created at or around the time of the event that is recorded in the document.

(f) *Eligible surviving beneficiary* means a spouse, child, parent, grandchild or grandparent who is entitled under section 6(c)(4)(A) or (B) of the Act to file a claim or receive a payment on behalf of a deceased claimant.

(g) *Grandchild* means a child of a child of the claimant.

(h) *Grandparent* means a parent of a parent of the claimant.

(i) *Immediate family member* of a person means a spouse or child if the person is an adult; but if the person is a minor, *immediate family member* means a parent.

(j) *Indian Tribe* means any Indian Tribe, band, nation, pueblo, or other organized group or community that is recognized as eligible for special programs and services provided by the United States to Indian Tribes.

(k) *Medical document, documentation, or record* means any

contemporaneous record of any physician, hospital, clinic, or other certified or licensed health care provider, or any other records routinely and reasonably relied on by physicians in making a diagnosis.

(l) *Onset* or *incidence* of a specified compensable disease means the date a physician first diagnosed the disease.

(m) *Parent* means the natural or adoptive father or mother of the claimant.

(n) *Program* or *Radiation Exposure Compensation Program* means the component of the Constitutional and Specialized Torts Litigation Section of the Torts Branch of the Civil Division of the United States Department of Justice designated by the Attorney General to execute the powers, duties, and responsibilities assigned to the Attorney General pursuant to pertinent provisions of the Act.

(o) *Spouse* means a wife or husband who was married to the claimant for a period of at least one (1) year immediately before the death of the claimant.

(p) *Tribal organization* means any formally organized group or other entity that is chartered, registered or sponsored by an Indian Tribe to perform duties for an Indian Tribe and is accountable for its actions to the tribal government.

(q) *Trust Fund* or *Fund* means the Radiation Exposure Compensation Trust Fund in the Department of the Treasury, administered by the Secretary of the Treasury pursuant to section 3 of the Act.

**§ 79.3 Compensable claim categories under the Act.**

(a) In order to receive a compensation payment, each claimant or eligible surviving beneficiary must establish that the claimant meets each and every criterion of eligibility for at least one of the following compensable categories designated in the Act:

(1) *Claims of leukemia.* (i) For persons exposed to fallout from the atmospheric detonation of nuclear devices at the Nevada Test Site due to their physical presence in an affected area during a designated time period, the amount of compensation is \$50,000.

(ii) For persons exposed to fallout from the atmospheric detonation of nuclear devices due to their participation onsite in a test involving the atmospheric detonation of a nuclear device, the amount of compensation is \$75,000. The regulations governing these claims are set forth in subpart B of this part.

(2) *Claims related to the Nevada Test Site fallout.* For persons who contracted



certain specified diseases after being exposed to fallout from the atmospheric detonation of nuclear devices at the Nevada Test Site due to their physical presence in an affected area during a designated time period, the amount of compensation is \$50,000. The regulations governing these claims are set forth in subpart C of this part.

(3) *Claims of onsite participants.* For persons who contracted certain specified diseases after onsite participation in the atmospheric detonation of a nuclear device, the amount of compensation is \$75,000. The regulations governing these claims are set forth in subpart D of this part.

(4) *Miners' claims.* For persons who contracted lung cancer or certain nonmalignant respiratory diseases after being employed in uranium mines located in specified states during the designated time period who were exposed to a specified minimum level of radiation during the course of their employment or worked for at least one year (12 consecutive or cumulative months) in a uranium mine in specified states during the designated time period, the amount of compensation is \$100,000. The regulations governing these claims are set forth in subpart E of this part.

(5) *Millers' claims.* For persons who contracted lung cancer, certain nonmalignant respiratory diseases, renal cancer, or chronic renal disease (including nephritis and kidney tubal tissue injury) following employment for at least one year (12 consecutive or cumulative months) in a uranium mill in specified states during the designated time period, the amount of compensation is \$100,000. The regulations governing these claims are set forth in subpart F of this part.

(6) *Ore transporters' claims.* For persons who contracted lung cancer, certain nonmalignant respiratory diseases, renal cancer, or chronic renal disease (including nephritis and kidney tubal tissue injury) following employment for at least one year (12 consecutive or cumulative months) as a transporter of uranium ore or vanadium-uranium ore from a uranium mine or uranium mill located in specified states during the designated time period, the amount of compensation is \$100,000. The regulations governing these claims are set forth in subpart G of this part.

(b) Any claim that does not meet all the criteria for at least one of these categories, as set forth in paragraph (a) of this section, must be denied.

(c) All claims for compensation under the Act must comply with the claims procedures and requirements set forth

in subpart H of this part before any payment can be made from the Fund.

#### **§ 79.4 Determination of claims and affidavits.**

(a) The claimant, eligible surviving beneficiary, or beneficiaries bear the burden of providing evidence of the existence of each element necessary to establish eligibility under any compensable claim category set forth in § 79.3(a).

(b) In the event that reasonable doubt exists with regard to whether a claim meets the requirements of the Act, that doubt shall be resolved in favor of the claimant or eligible surviving beneficiary.

(c) Written affidavits or declarations, subject to penalty for perjury, will be accepted only for the following purposes:

(1) To establish eligibility of family members as set forth in § 79.71(e), (f), (g), (h), or (i);

(2) To establish other compensation received as set forth in § 79.75(c) or (d);

(3) To establish employment in a uranium mine, mill or as an ore transporter on the standard claim form in the manner set forth in §§ 79.43(d), 79.53(d) and 79.63(d), respectively; and

(4) To substantiate the claimant's uranium mining employment history for purposes of determining working level months of radiation exposure by providing the types of information set forth in § 79.43(d), so long as the affidavit or declaration:

(i) Is provided in addition to any other material that may be used to substantiate the claimant's employment history as set forth in § 79.43;

(ii) Is made subject to penalty for perjury;

(iii) Attests to the employment history of the claimant; and

(iv) Is made by a person other than the individual filing the claim.

#### **§ 79.5 Requirements for medical documentation, contemporaneous records, and other records or documents.**

(a) All medical documentation, contemporaneous records, and other records or documents submitted by a claimant or eligible surviving beneficiary to prove any criterion provided for in this part must be originals, or certified copies of the originals, unless it is impossible to obtain an original or certified copy of the original. If it is impossible for a claimant to provide an original or certified copy of an original, the claimant or eligible surviving beneficiary must provide a written statement with the uncertified copy setting forth the reason why it is

impossible to provide an original or a certified copy of an original.

(b) All documents submitted by a claimant or eligible surviving beneficiary must bear sufficient indicia of authenticity or a sufficient guarantee of trustworthiness. The Program shall not accept as proof of any criterion of eligibility any document that does not bear sufficient indicia of authenticity, or is in such a physical condition, or contains such information, that otherwise indicates the record or document is not reliable or trustworthy. When a record or document is not accepted by the Program under this section, the claimant or eligible surviving beneficiary shall be notified and afforded the opportunity to submit additional documentation in accordance with § 79.72(b) or (c).

(c) To establish eligibility the claimant or eligible surviving beneficiary may be required to provide additional records to the extent they exist. Nothing in this section shall be construed to limit the Assistant Director's (specified in § 79.70(a)) ability to require additional documentation.

### **Subpart B—Eligibility Criteria for Claims Relating to Leukemia**

#### **§ 79.10 Scope of subpart.**

The regulations in this subpart describe the criteria for eligibility for compensation under section 4(a)(1) of the Act and the evidence that will be accepted as proof of the various eligibility criteria. Section 4(a)(1) of the Act provides for a payment of \$50,000 to individuals exposed to fallout from the detonation of atmospheric nuclear devices at the Nevada Test Site due to their physical presence in an affected area during a designated time period and who later developed leukemia, and \$75,000 to individuals who participated onsite in a test involving the atmospheric detonation of a nuclear device and who later developed leukemia.

#### **§ 79.11 Definitions.**

(a) *Affected area* means one of the following geographical areas, as they were recognized by the state in which they are located, as of July 10, 2000:

(1) In the State of Utah, the counties of Beaver, Garfield, Iron, Kane, Millard, Piute, San Juan, Sevier, Washington, and Wayne;

(2) In the State of Nevada, the counties of Eureka, Lander, Lincoln, Nye, White Pine, and that portion of Clark County that consists of townships 13 through 16 at ranges 63 through 71;

(3) In the State of Arizona, the counties of Coconino, Yavapai, Navajo,

Apache, Gila, and that part of Arizona that is north of the Grand Canyon.

(b) *Atmospheric detonation of a nuclear device* means only a test conducted by the United States prior to January 1, 1963, as listed in § 79.31(d).

(c) *Designated time period* means the period beginning on January 21, 1951, and ending on October 31, 1958, or the period beginning on June 30, 1962, and ending on July 31, 1962, whichever is applicable.

(d) *First exposure or initial exposure* means the date on which the claimant was first physically present in the affected area during the designated time period, or the date on which the claimant first participated onsite in an atmospheric detonation of a nuclear device, whichever is applicable.

(e) *Leukemia* means any medically recognized form of acute or chronic leukemia other than chronic lymphocytic leukemia.

(f) *Onsite* means physical presence above or within the official boundaries of any of the following locations:

(1) The Nevada Test Site (NTS), Nevada;

(2) The Pacific Test Sites (Bikini Atoll, Eniwetok Atoll, Johnston Island, Christmas Island, the test site for the shot during Operation Wigwam, the test site for Shot Yucca during Operation Hardtack I, and the test sites for Shot Frigate Bird and Shot Swordfish during Operation Dominic I) and the official zone around each site from which non-test affiliated ships were excluded for security and safety purposes;

(3) The Trinity Test Site (TTS), New Mexico;

(4) The South Atlantic Test Site for Operation Argus and the official zone around the site from which non-test affiliated ships were excluded for security and safety purposes;

(5) Any designated location within a Naval Shipyard, Air Force Base, or other official government installation where ships, aircraft, or other equipment used in an atmospheric nuclear detonation were decontaminated; or

(6) Any designated location used for the purpose of monitoring fallout from an atmospheric nuclear test conducted at the Nevada Test Site.

(g) *Participant* means an individual—

(1) Who was:

(i) A member of the armed forces;

(ii) A civilian employee or contract employee of the Manhattan Engineer District, the Armed Forces Special Weapons Project, the Defense Atomic Support Agency, the Defense Nuclear Agency, or the Department of Defense or its components or agencies or predecessor components or agencies;

(iii) An employee or contract employee of the Atomic Energy

Commission, the Energy Research and Development Administration, or the Department of Energy;

(iv) A member of the Federal Civil Defense Administration or the Office of Civil and Defense Mobilization; or

(v) A member of the United States Public Health Service; and

(2) Who:

(i) Performed duties within the identified operational area around each atmospheric detonation of a nuclear device;

(ii) Participated in the decontamination of any ships, planes, or equipment used during the atmospheric detonation of a nuclear device;

(iii) Performed duties as a cloud tracker or cloud sampler;

(iv) Served as a member of the garrison or maintenance forces on the atoll of Eniwetok between June 21, 1951, and July 1, 1952; between August 7, 1956, and August 7, 1957; or between November 1, 1958, and April 30, 1959; or

(v) Performed duties as a member of a mobile radiological safety team monitoring the pattern of fallout from an atmospheric detonation of a nuclear device.

(h) *Period of atmospheric nuclear testing* means any of the periods associated with each test operation specified in § 79.31(d), plus an additional six-month period thereafter.

(i) *Physically present* (or *physical presence*) means present (or presence) for a substantial period of each day.

#### **§ 79.12 Criteria for eligibility for claims relating to leukemia.**

To establish eligibility for compensation under this subpart, a claimant or eligible surviving beneficiary must establish each of the following:

(a)(1) That the claimant was physically present at any place within the affected area for a period of at least one year (12 consecutive or cumulative months) during the period beginning on January 21, 1951, and ending on October 31, 1958;

(2) That the claimant was physically present at any place within the affected area for the entire, continuous period beginning on June 30, 1962, and ending on July 31, 1962; or

(3) That the claimant was present onsite at any time during a period of atmospheric nuclear testing and was a participant during that period in the atmospheric detonation of a nuclear device;

(b) That after such period of physical presence or onsite participation the claimant contracted leukemia;

(c) That the claimant's initial exposure occurred prior to age 21; and

(d) That the onset of the leukemia occurred more than two years after the date of the claimant's first exposure to fallout.

#### **§ 79.13 Proof of physical presence for the requisite period and proof of participation onsite during a period of atmospheric nuclear testing.**

(a) Proof of physical presence may be made by the submission of any trustworthy contemporaneous record that, on its face or in conjunction with other such records, establishes that the claimant was present in the affected area for the requisite period during the designated time period. Examples of such records include:

(1) Records of the federal government (including verified information submitted for a security clearance), any tribal government, or any state, county, city or local governmental office, agency, department, board or other entity, or other public office or agency;

(2) Records of any accredited public or private educational institution;

(3) Records of any private utility licensed or otherwise approved by any governmental entity, including any such utility providing telephone services;

(4) Records of any public or private library;

(5) Records of any state or local historical society;

(6) Records of any religious organization;

(7) Records of any regularly conducted business activity or entity;

(8) Records of any recognized civic or fraternal association or organization; and

(9) Medical records created during the designated time period.

(b) Proof of physical presence by contemporaneous records may also be made by submission of original postcards and envelopes from letters (not copies) addressed to the claimant or an immediate family member during the designated time period that bear a postmark and a cancelled stamp(s).

(c) The Program will presume that an individual who resided or was employed on a full-time basis within the affected area was physically present during the time period of residence or full-time employment.

(d) For purposes of establishing eligibility under § 79.12(a)(1), the Program will presume that proof of a claimant's residence at one or more addresses or proof of full-time employment at one location within the affected area on any two dates less than three years apart during the period beginning on January 21, 1951, and ending on October 31, 1958, establishes the claimant's presence within the

affected area for the period between the two dates reflected in the documentation submitted as proof of presence.

(e) For purposes of establishing eligibility under § 79.12(a)(1), the Program will presume that proof of residence at one or more addresses or proof of full-time employment at one location within the affected area on two dates, one of which is before January 21, 1951, and another of which is within the specified time period, establishes the claimant's presence in the affected area between January 21, 1951, and the date within the specified time period, provided the dates are not more than three years apart.

(f) For purposes of establishing eligibility under § 79.12(a)(1), the Program will presume that proof of residence at one or more addresses or proof of full-time employment at one location within the affected area on two dates, one of which is after October 31, 1958, and another of which is within the specified time period, establishes the claimant's presence in the affected area between the date within the specified time period and October 31, 1958, provided the dates are not more than three years apart.

(g) For purposes of establishing eligibility under § 79.12(a)(2), the Program will presume that proof of residence or proof of full-time employment within the affected area at least one day during the period beginning June 30, 1962, and ending July 31, 1962, and proof of residence or proof of full-time employment at the same address or location within six months before June 30, 1962, and six months after July 31, 1962, establishes the claimant's physical presence for the necessary one-month-and-one-day period.

(h) For purposes of establishing eligibility under § 79.12(a)(2), the Program will presume that proof of residence or full-time employment at the same address or location on two separate dates at least 14 days apart within the time period beginning June 30, 1962, and ending July 31, 1962, establishes the claimant's physical presence for the necessary one-month-and-one-day period.

(i) For purposes of establishing eligibility under § 79.12(a)(3), the claimant must establish, in accordance with § 79.33, that he or she participated onsite in the atmospheric detonation of a nuclear device.

#### **§ 79.14 Proof of initial exposure prior to age 21.**

(a) Proof of the claimant's date of birth must be established by the submission of any of the following:

- (1) Birth certificate;
- (2) Baptismal certificate;
- (3) Tribal records; or
- (4) Hospital records of birth.

(b) Absent any indication to the contrary, the Program will assume that the earliest date within the designated time period indicated on any records accepted by the Program as proof of the claimant's physical presence in the affected area or participation during a period of atmospheric nuclear testing was also the date of initial exposure.

#### **§ 79.15 Proof of onset of leukemia more than two years after first exposure.**

The Program will presume that the date of onset was the date of diagnosis as indicated in the medical documentation accepted by the Program as proof of the claimant's leukemia. The date of onset must be more than two years after the date of first exposure as determined under § 79.14(b).

#### **§ 79.16 Proof of medical condition.**

(a) Medical documentation is required in all cases to prove that the claimant suffered from or suffers from leukemia. Proof that the claimant contracted leukemia must be made either by using the procedure outlined in paragraph (b) of this section or by submitting the documentation required in paragraph (c) of this section.

(b) If a claimant was diagnosed as having leukemia in Arizona, Colorado, Nevada, New Mexico, Utah or Wyoming, the claimant or eligible surviving beneficiary need not submit any medical documentation of disease at the time the claim is filed (although medical documentation may subsequently be required). Instead, the claimant or eligible surviving beneficiary must submit with the claim an Authorization To Release Medical and Other Information, valid in the state of diagnosis, that authorizes the Program to contact the appropriate state cancer or tumor registry. The Program will accept as proof of medical condition verification from the state cancer or tumor registry that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of one type of leukemia. If the designated state does not possess medical records or abstracts of medical records that contain a verified diagnosis of leukemia, the Radiation Exposure Compensation Program will notify the claimant or eligible surviving beneficiary and afford

that individual the opportunity to submit the medical documentation required in paragraph (c) of this section, in accordance with the provisions of § 79.72(b).

(c)(1) Proof that the claimant contracted leukemia may be made by the submission of one or more of the following contemporaneous medical records provided that the specified document contains an explicit statement of diagnosis or such other information or data from which appropriate authorities at the National Cancer Institute can make a diagnosis of leukemia to a reasonable degree of medical certainty:

- (i) Bone marrow biopsy or aspirate report;
- (ii) Peripheral white blood cell differential count report;
- (iii) Autopsy report;
- (iv) Hospital discharge summary;
- (v) Physician summary report;
- (vi) History and physical report; or
- (vii) Death certificate, provided that it is signed by a physician at the time of death.

(2) If the medical record submitted does not contain sufficient information or data to make such a diagnosis, the Program will notify the claimant or eligible surviving beneficiary and afford that individual the opportunity to submit additional medical records identified in this paragraph, in accordance with the provisions of § 79.72(b). Any such additional medical documentation submitted must also contain sufficient information from which appropriate authorities at the National Cancer Institute can determine the type of leukemia contracted by the claimant.

### **Subpart C—Eligibility Criteria for Claims Relating to Certain Specified Diseases Contracted After Exposure in an Affected Area (“Downwinders”)**

#### **§ 79.20 Scope of subpart.**

The regulations in this subpart describe the criteria for eligibility for compensation under sections 4(a)(2) (A) and (B) of the Act and the evidence that will be accepted as proof of the various eligibility criteria. Sections 4(a)(2) (A) and (B) of the Act provide for a payment of \$50,000 to individuals who were exposed to fallout from the atmospheric detonation of nuclear devices at the Nevada Test Site due to their physical presence in an affected area during a designated time period and who later developed one or more specified compensable diseases.

#### **§ 79.21 Definitions.**

(a) The definitions listed in § 79.11 (a) through (e) and (i) apply to this subpart.

(b) *Indication of disease* means any medically significant information that suggests the presence of a disease, whether or not the presence of the disease is later confirmed.

(c) *Leukemia, chronic lymphocytic leukemia, multiple myeloma, lymphomas, Hodgkin's disease, primary cancer of the thyroid, primary cancer of the male breast, primary cancer of the female breast, primary cancer of the esophagus, primary cancer of the stomach, primary cancer of the pharynx, primary cancer of the small intestine, primary cancer of the pancreas, primary cancer of the bile ducts, primary cancer of the gallbladder, primary cancer of the salivary gland, primary cancer of the urinary bladder, primary cancer of the brain, primary cancer of the colon, primary cancer of the ovary, primary cancer of the liver, and primary cancer of the lung* mean the physiological conditions that are recognized by the National Cancer Institute under those names or nomenclature, or under any previously accepted or commonly used names or nomenclature.

(d) *Specified compensable diseases* means leukemia (other than chronic lymphocytic leukemia), provided that initial exposure occurred after the age of 20 and that the onset of the disease was at least two years after first exposure, and the following diseases, provided onset was at least five years after first exposure: multiple myeloma; lymphomas (other than Hodgkin's disease); and primary cancer of the thyroid, male or female breast, esophagus, stomach, pharynx, small intestine, pancreas, bile ducts, gallbladder, salivary gland, urinary bladder, brain, colon, ovary, liver (except if cirrhosis or hepatitis B is indicated), or lung.

**§ 79.22 Criteria for eligibility for claims relating to certain specified diseases contracted after exposure in an affected area ("downwinders").**

To establish eligibility for compensation under this subpart, a claimant or eligible surviving beneficiary must establish each of the following:

(a)(1) That the claimant was physically present at any place within the affected area for a period of at least two years (24 consecutive or cumulative months) during the period beginning on January 21, 1951, and ending on October 31, 1958; or

(2) That the claimant was physically present at any place within the affected area for the entire, continuous period beginning on June 30, 1962, and ending on July 31, 1962; and

(b) That after such period of physical presence the claimant contracted one of the following specified compensable diseases:

(1) Leukemia (other than chronic lymphocytic leukemia), provided that:

(i) The claimant's initial exposure occurred after the age of 20; and

(ii) The onset of the disease occurred at least two years after first exposure;

(2) Multiple myeloma, provided onset occurred at least five years after first exposure;

(3) Lymphomas, other than Hodgkin's disease, provided onset occurred at least five years after first exposure;

(4) Primary cancer of the thyroid, provided onset occurred at least five years after first exposure;

(5) Primary cancer of the male or female breast, provided onset occurred at least five years after first exposure;

(6) Primary cancer of the esophagus, provided onset occurred at least five years after first exposure;

(7) Primary cancer of the stomach, provided onset occurred at least five years after first exposure;

(8) Primary cancer of the pharynx, provided onset occurred at least five years after first exposure;

(9) Primary cancer of the small intestine, provided onset occurred at least five years after first exposure;

(10) Primary cancer of the pancreas, provided onset occurred at least five years after first exposure;

(11) Primary cancer of the bile ducts, provided onset occurred at least five years after first exposure;

(12) Primary cancer of the gallbladder, provided onset occurred at least five years after first exposure;

(13) Primary cancer of the salivary gland, provided onset occurred at least five years after first exposure;

(14) Primary cancer of the urinary bladder, provided onset occurred at least five years after first exposure;

(15) Primary cancer of the brain, provided onset occurred at least five years after first exposure;

(16) Primary cancer of the colon, provided onset occurred at least five years after first exposure;

(17) Primary cancer of the ovary, provided onset occurred at least five years after first exposure;

(18) Primary cancer of the liver, provided,

(i) Onset occurred at least five years after first exposure;

(ii) There is no indication of the presence of hepatitis B; and

(iii) There is no indication of the presence of cirrhosis; or

(19) Primary cancer of the lung, provided onset occurred at least five years after first exposure.

**§ 79.23 Proof of physical presence for the requisite period.**

(a) Proof of physical presence for the requisite period may be made in accordance with the provisions of § 79.13(a) and (b). An individual who resided or was employed on a full-time basis within the affected area is presumed to have been physically present during the time period of residence or full-time employment.

(b) For purposes of establishing eligibility under § 79.22(a)(1), the Program will presume that proof of residence at one or more addresses or proof of full-time employment at one location within the affected area on any two dates less than three years apart, during the period beginning on January 21, 1951, and ending on October 31, 1958, establishes the claimant's presence within the affected area for the period between the two dates reflected in the documentation submitted as proof of presence.

(c) For purposes of establishing eligibility under § 79.22(a)(1), the Program will presume that proof of residence at one or more addresses or proof of full-time employment at one location within the affected area on two dates, one of which is before January 21, 1951, and another of which is within the specified time period, establishes the claimant's presence in the affected area between January 21, 1951, and the date within the specified time period, provided the dates are not more than three years apart.

(d) For purposes of establishing eligibility under § 79.22(a)(1), the Program will presume that proof of residence at one or more addresses or proof of full-time employment at one location within the affected area on two dates, one of which is after October 31, 1958, and another of which is within the specified time period, establishes the claimant's presence in the affected area between the date within the specified time period and October 31, 1958, provided the dates are not more than three years apart.

(e) For purposes of establishing eligibility under § 79.22(a)(2), the Program will apply the presumptions contained in § 79.13(g) and (h).

**§ 79.24 Proof of initial or first exposure after age 20 for claims under § 79.22(b)(1).**

(a) Proof of the claimant's date of birth must be established in accordance with the provisions of § 79.14(a).

(b) Absent any indication to the contrary, the Program will presume that the earliest date within the designated time period indicated on any records accepted by the Program as proof of the claimant's physical presence in the

affected area was the date of initial or first exposure.

**§ 79.25 Proof of onset of leukemia at least two years after first exposure, and proof of onset of a specified compensable disease more than five years after first exposure.**

The date of onset will be the date of diagnosis as indicated in the medical documentation accepted by the Radiation Exposure Compensation Program as proof of the claimant's specified compensable disease. The date of onset must be at least five years after the date of first exposure as determined under § 79.24(b). In the case of leukemia, the date of onset must be at least two years after the date of first exposure.

**§ 79.26 Proof of medical condition.**

(a) Medical documentation is required in all cases to prove that the claimant suffered from or suffers from any specified compensable disease. Proof that the claimant contracted a specified compensable disease must be made either by using the procedure outlined in paragraph (b) of this section or by submitting the documentation required in paragraph (c) of this section. (For claims relating to primary cancer of the liver, the claimant or eligible surviving beneficiary must also submit the additional medical documentation prescribed in § 79.27.)

(b) If a claimant was diagnosed as having one of the specified compensable diseases in Arizona, Colorado, Nevada, New Mexico, Utah or Wyoming, the claimant or eligible surviving beneficiary need not submit any medical documentation of disease at the time the claim is filed (although medical documentation subsequently may be required). Instead, the claimant or eligible surviving beneficiary may submit with the claim an Authorization to Release Medical and Other Information, valid in the state of diagnosis, that authorizes the Program to contact the appropriate state cancer or tumor registry. The Program will accept as proof of medical condition verification from the state cancer or tumor registry that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of one of the specified compensable diseases. If the designated state does not possess medical records or abstracts of medical records that contain a verified diagnosis of one of the specified compensable diseases, the Program will notify the claimant or eligible surviving beneficiary and afford that individual the opportunity to submit the written medical documentation required in paragraph (c)

of this section, in accordance with the provisions of § 79.72(b).

(c) Proof that the claimant contracted a specified compensable disease may be made by the submission of one or more of the contemporaneous medical records listed in this paragraph, provided that the specified document contains an explicit statement of diagnosis and such other information or data from which the appropriate authorities with the National Cancer Institute can make a diagnosis to a reasonable degree of medical certainty. If the medical record submitted does not contain sufficient information or data to make such a diagnosis, the Program will notify the claimant or eligible surviving beneficiary and afford that individual the opportunity to submit additional medical records identified in this paragraph, in accordance with the provisions of § 79.72(b). The medical documentation submitted under this section to establish that the claimant contracted leukemia or a lymphoma must also contain sufficient information from which the appropriate authorities with the National Cancer Institute can determine the type of leukemia or lymphoma contracted by the claimant. Proof of leukemia shall be made by submitting one or more of the documents listed in § 79.16(c).

(1) *Multiple myeloma.*

(i) Pathology report of tissue biopsy;  
(ii) Autopsy report;  
(iii) Report of serum electrophoresis;  
(iv) One of the following summary medical reports:  
(A) Physician summary report;  
(B) Hospital discharge summary report;  
(C) Hematology summary or consultation report;  
(D) Medical oncology summary or consultation report; or  
(E) X-ray report; or  
(v) Death certificate, provided that it is signed by a physician at the time of death.

(2) *Lymphomas.*

(i) Pathology report of tissue biopsy;  
(ii) Autopsy report;  
(iii) One of the following summary medical reports:  
(A) Physician summary report;  
(B) Hospital discharge summary report;  
(C) Hematology consultation or summary report; or  
(D) Medical oncology consultation or summary report; or  
(iv) Death certificate, provided that it is signed by a physician at the time of death.

(3) *Primary cancer of the thyroid.*

(i) Pathology report of tissue biopsy or fine needle aspirate;

(ii) Autopsy report;  
(iii) One of the following summary medical reports:

(A) Physician summary report;  
(B) Hospital discharge summary report;

(C) Operative summary report;  
(D) Medical oncology summary or consultation report; or

(iv) Death certificate, provided that it is signed by a physician at the time of death.

(4) *Primary cancer of the male or female breast.*

(i) Pathology report of tissue biopsy or surgical resection;

(ii) Autopsy report;  
(iii) One of the following summary medical reports:

(A) Physician summary report;  
(B) Hospital discharge summary report;

(C) Operative report;  
(D) Medical oncology summary or consultation report; or

(E) Radiotherapy summary or consultation report;  
(iv) Report of mammogram;  
(v) Report of bone scan; or  
(vi) Death certificate, provided that it is signed by a physician at the time of death.

(5) *Primary cancer of the esophagus.*

(i) Pathology report of tissue biopsy or surgical resection;

(ii) Autopsy report;  
(iii) Endoscopy report;  
(iv) One of the following summary medical reports:

(A) Physician summary report;  
(B) Hospital discharge summary report;

(C) Operative report;  
(D) Radiotherapy report; or  
(E) Medical oncology consultation or summary report;

(v) One of the following radiological studies:

(A) Esophagram;  
(B) Barium swallow;  
(C) Upper gastrointestinal (GI) series;  
(D) Computerized tomography (CT)

scan; or  
(E) Magnetic resonance imaging (MRI); or

(vi) Death certificate, provided that it is signed by a physician at the time of death.

(6) *Primary cancer of the stomach.*

(i) Pathology report of tissue biopsy or surgical resection;

(ii) Autopsy report;  
(iii) Endoscopy or gastroscopy report;  
(iv) One of the following summary medical reports:

(A) Physician summary report;  
(B) Hospital discharge summary report;

(C) Operative report;

(D) Radiotherapy report; or  
 (E) Medical oncology summary report;  
 (v) One of the following radiological studies:  
 (A) Barium swallow;  
 (B) Upper gastrointestinal (GI) series;  
 (C) Computerized tomography (CT) series; or  
 (D) Magnetic resonance imaging (MRI); or  
 (vi) Death certificate, provided that it is signed by a physician at the time of death.  
 (7) *Primary cancer of the pharynx.*  
 (i) Pathology report of tissue biopsy or surgical resection;  
 (ii) Autopsy report;  
 (iii) Endoscopy report;  
 (iv) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Report of otolaryngology examination;  
 (D) Radiotherapy summary report;  
 (E) Medical oncology summary report;  
 or  
 (F) Operative report;  
 (v) Report of one of the following radiological studies:  
 (A) Laryngograms;  
 (B) Tomograms of soft tissue and lateral radiographs;  
 (C) Computerized tomography (CT) scan; or  
 (D) Magnetic resonance imaging (MRI); or  
 (vi) Death certificate, provided that it is signed by a physician at the time of death.  
 (8) *Primary cancer of the small intestine.*  
 (i) Pathology report of tissue biopsy;  
 (ii) Autopsy report;  
 (iii) Endoscopy report, provided that the examination covered the duodenum and parts of the jejunum;  
 (iv) Colonoscopy report, provided that the examination covered the distal ileum;  
 (v) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Report of gastroenterology examination;  
 (D) Operative report;  
 (E) Radiotherapy summary report; or  
 (F) Medical oncology summary or consultation report;  
 (vi) Report of one of the following radiologic studies:  
 (A) Upper gastrointestinal (GI) series with small bowel follow-through;  
 (B) Angiography;  
 (C) Computerized tomography (CT) scan; or

(D) Magnetic resonance imaging (MRI); or  
 (vii) Death certificate, provided that it is signed by a physician at the time of death.  
 (9) *Primary cancer of the pancreas.*  
 (i) Pathology report of tissue biopsy or fine needle aspirate;  
 (ii) Autopsy report;  
 (iii) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Radiotherapy summary report; or  
 (D) Medical oncology summary report;  
 (iv) Report of one of the following radiographic studies:  
 (A) Endoscopic retrograde cholangiopancreatography (ERCP);  
 (B) Upper gastrointestinal (GI) series;  
 (C) Arteriography of the pancreas;  
 (D) Ultrasonography;  
 (E) Computerized tomography (CT) scan; or  
 (F) Magnetic resonance imaging (MRI); or  
 (v) Death certificate, provided that it is signed by a physician at the time of death.  
 (10) *Primary cancer of the bile ducts.*  
 (i) Pathology report of tissue biopsy or surgical resection;  
 (ii) Autopsy report;  
 (iii) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Operative report;  
 (D) Gastroenterology consultation report; or  
 (E) Medical oncology summary or consultation report;  
 (iv) Report of one of the following radiographic studies:  
 (A) Ultrasonography;  
 (B) Endoscopic retrograde cholangiography;  
 (C) Percutaneous cholangiography; or  
 (D) Computerized tomography (CT) scan; or  
 (v) Death certificate, provided that it is signed by a physician at the time of death.  
 (11) *Primary cancer of the gallbladder.*  
 (i) Pathology report of tissue from surgical resection;  
 (ii) Autopsy report;  
 (iii) Report of one of the following radiological studies:  
 (A) Computerized tomography (CT) scan;  
 (B) Magnetic resonance imaging (MRI); or  
 (C) Ultrasonography (ultrasound);  
 (iv) One of the following summary medical reports:

(A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Operative report;  
 (D) Radiotherapy report; or  
 (E) Medical oncology summary or report; or  
 (v) Death certificate, provided that it is signed by a physician at the time of death.  
 (12) *Primary cancer of the liver.*  
 (i) Pathology report of tissue biopsy or surgical resection;  
 (ii) Autopsy report;  
 (iii) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Medical oncology summary report;  
 (D) Operative report; or  
 (E) Gastroenterology report;  
 (iv) Report of one of the following radiological studies:  
 (A) Computerized tomography (CT) scan;  
 (B) Magnetic resonance imaging (MRI); or  
 (v) Death certificate, provided that it is signed by a physician at the time of death.  
 (13) *Primary cancer of the lung.*  
 (i) Pathology report of tissue biopsy or resection, including, but not limited to specimens obtained by any of the following methods:  
 (A) Surgical resection;  
 (B) Endoscopic endobronchial or transbronchial biopsy;  
 (C) Bronchial brushings and washings;  
 (D) Pleural fluid cytology;  
 (E) Fine needle aspirate;  
 (F) Pleural biopsy; or  
 (G) Sputum cytology;  
 (ii) Autopsy report;  
 (iii) Report of bronchoscopy, with or without biopsy;  
 (iv) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Radiotherapy summary report;  
 (D) Medical oncology summary report; or  
 (E) Operative report;  
 (v) Report of one of the following radiology examinations:  
 (A) Computerized tomography (CT) scan;  
 (B) Magnetic resonance imaging (MRI);  
 (C) X-rays of the chest; or  
 (D) Chest tomograms; or  
 (vi) Death certificate, provided that it is signed by a physician at the time of death.  
 (14) *Primary cancer of the salivary gland.*

(i) Pathology report of tissue biopsy or surgical resection;  
 (ii) Autopsy report;  
 (iii) Report of otolaryngology or oral maxillofacial examination;  
 (iv) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Radiotherapy summary report;  
 (D) Medical oncology summary report; or  
 (E) Operative report;  
 (v) Report of one of the following radiology examinations:  
 (A) Computerized tomography (CT) scan; or  
 (B) Magnetic resonance imaging (MRI); or  
 (vi) Death certificate, provided that it is signed by a physician at the time of death.

(15) *Primary cancer of the urinary bladder.*  
 (i) Pathology report of tissue biopsy or surgical resection;  
 (ii) Autopsy report;  
 (iii) Report of cytology, with or without biopsy;  
 (iv) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Radiotherapy summary report;  
 (D) Medical oncology summary report; or  
 (E) Operative report;  
 (v) Report of one of the following radiology examinations:  
 (A) Computerized tomography (CT) scan; or  
 (B) Magnetic resonance imaging (MRI); or  
 (vi) Death certificate, provided that it is signed by a physician at the time of death.

(16) *Primary cancer of the brain.*  
 (i) Pathology report of tissue biopsy or surgical resection;  
 (ii) Autopsy report;  
 (iii) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Radiotherapy summary report;  
 (D) Medical oncology summary report; or  
 (E) Operative report;  
 (iv) Report of one of the following radiology examinations:  
 (A) Computerized tomography (CT) scan;  
 (B) Magnetic resonance imaging (MRI); or  
 (C) CT or MRI with enhancement; or  
 (v) Death certificate, provided that it is signed by a physician at the time of death.

(17) *Primary cancer of the colon.*  
 (i) Pathology report of tissue biopsy;  
 (ii) Autopsy report;  
 (iii) Endoscopy report, provided the examination covered the duodenum and parts of the jejunum;  
 (iv) Colonoscopy report, provided that the examination covered the distal ileum;  
 (v) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Report of gastroenterology examination;  
 (D) Operative report;  
 (E) Radiotherapy summary report; or  
 (F) Medical oncology summary or consultation report;  
 (vi) Report of one of the following radiologic studies:  
 (A) Upper gastrointestinal (GI) series with small bowel follow-through;  
 (B) Angiography;  
 (C) Computerized tomography (CT) scan; or  
 (D) Magnetic resonance imaging (MRI); or  
 (vii) Death certificate, provided that it is signed by a physician at the time of death.

(18) *Primary cancer of the ovary.*  
 (i) Pathology report of tissue biopsy or surgical resection;  
 (ii) Autopsy report;  
 (iii) One of the following summary medical reports:  
 (A) Physician summary report;  
 (B) Hospital discharge summary report;  
 (C) Radiotherapy summary report;  
 (D) Medical oncology summary report; or  
 (E) Operative report; or  
 (iv) Death certificate, provided that it is signed by a physician at the time of death.

#### **§ 79.27 Indication of the presence of hepatitis B or cirrhosis.**

(a)(1) If the claimant or eligible surviving beneficiary is claiming eligibility under this subpart for primary cancer of the liver, the claimant or eligible surviving beneficiary must submit, in addition to proof of the disease, all medical records pertaining to the claimant listed below from any hospital, medical facility, or health care provider that were created within the period six months before and six months after the date of diagnosis of primary cancer of the liver:  
 (i) All history and physical examination reports;  
 (ii) All operative and consultation reports;  
 (iii) All pathology reports; and

(iv) All physician, hospital, and health care facility admission and discharge summaries.  
 (2) In the event that any of the records in paragraph (a)(1) of this section no longer exist, the claimant or eligible surviving beneficiary must submit a certified statement by the custodian(s) of those records to that effect.  
 (b) If the medical records listed in paragraph (a) of this section, or information possessed by the state cancer or tumor registries, indicates the presence of hepatitis B or cirrhosis, the Radiation Exposure Compensation Program will notify the claimant or eligible surviving beneficiary and afford that individual the opportunity to submit other written medical documentation or contemporaneous records in accordance with § 79.72(b) to establish that in fact there was no presence of hepatitis B or cirrhosis.  
 (c) The Program may also require that the claimant or eligible surviving beneficiary provide additional medical records or other contemporaneous records, or an authorization to release such additional medical and contemporaneous records, as may be needed to make a determination regarding the indication of the presence of hepatitis B or cirrhosis.

#### **Subpart D—Eligibility Criteria for Claims by Onsite Participants**

##### **§ 79.30 Scope of subpart.**

The regulations in this subpart describe the criteria for eligibility for compensation under section 4(a)(2)(C) of the Act, and the evidence that will be accepted as proof of the various eligibility criteria. Section 4(a)(2)(C) of the Act provides for a payment of \$75,000 to individuals who participated onsite in the atmospheric detonation of a nuclear device and later developed a specified compensable disease.

##### **§ 79.31 Definitions.**

(a) The definitions listed in § 79.11(b), (e), (f), (g), and (h), and in § 79.21, apply to this subpart.  
 (b) *Atmospheric detonation of a nuclear device* means only a test conducted by the United States prior to January 1, 1963, as listed in paragraph (d) of this section.  
 (c) *First exposure* or *initial exposure* means the date on which the claimant first participated onsite in an atmospheric detonation of a nuclear device.  
 (d) *Period of atmospheric nuclear testing* means one of the periods listed in this paragraph that are associated with each test operation, plus an additional six-month period thereafter:



| Event name  | Date     | Location                  | Event name   | Date     | Location  | Event name  | Date     | Location        |
|---|----------|---------------------------|--|----------|-----------|---|----------|-----------------|
| (1) For Operation Trinity, the period July 16, 1945, through August 6, 1945:  |          |                           | Ruth .....   | 03/31/53 | NTS.      | John .....  | 07/19/57 | NTS.            |
| Trinity .....   | 07/16/45 | Trinity Test Site.        | Dixie .....  | 04/06/53 | NTS.      | Kepler .....  | 07/24/57 | NTS.            |
| (2) For Operation Crossroads, the period June 28, 1946, through August 31, 1946, for all activities other than the decontamination of ships involved in Operation Crossroads; the period of atmospheric nuclear testing for the decontamination of ships involved in Operation Crossroads shall run from June 28, 1946, through November 30, 1946:  |          |                           | Ray .....  | 04/11/53 | NTS.      | Owens .....   | 07/25/57 | NTS.            |
| Able .....  | 07/01/46 | Bikini.                   | Badger .....   | 04/18/53 | NTS.      | Stokes .....  | 08/07/57 | NTS.            |
| Baker .....   | 07/25/46 | Bikini.                   | Simon .....  | 04/25/53 | NTS.      | Shasta .....  | 08/18/57 | NTS.            |
| (3) For Operation Sandstone, the period April 13, 1948, through May 20, 1948:   |          |                           | Encore .....   | 05/08/53 | NTS.      | Doppler .....   | 08/23/57 | NTS.            |
| X-ray .....   | 04/15/48 | Enewetak.                 | Harry .....  | 05/19/53 | NTS.      | Franklin Prime .....  | 08/30/57 | NTS.            |
| Yoke .....  | 05/01/48 | Enewetak.                 | Grable .....   | 05/25/53 | NTS.      | Smoky .....   | 08/31/57 | NTS.            |
| Zebra .....   | 05/15/48 | Enewetak.                 | Climax .....   | 06/04/53 | NTS.      | Galileo .....   | 09/02/57 | NTS.            |
| (4) For Operation Ranger, the period January 27, 1951, through February 7, 1951:  |          |                           | (10) For Operation Castle, the period February 27, 1954, through May 31, 1954  |          |           | Wheeler .....   | 09/06/57 | NTS.            |
| Able .....  | 01/27/51 | Nevada Test Site ("NTS"). | Bravo .....  | 03/01/54 | Bikini.   | Laplace .....   | 09/08/57 | NTS.            |
| Baker .....   | 01/28/51 | NTS.                      | Romeo .....  | 03/27/54 | Bikini.   | Fizeau .....  | 09/14/57 | NTS.            |
| Easy .....  | 02/01/51 | NTS.                      | Koon .....   | 04/07/54 | Bikini.   | Newton .....  | 09/16/57 | NTS.            |
| Baker-2 .....   | 02/02/51 | NTS.                      | Union .....  | 04/26/54 | Bikini.   | Whitney .....   | 09/23/57 | NTS.            |
| Fox .....   | 02/06/51 | NTS.                      | Yankee .....   | 05/05/54 | Bikini.   | Charleston .....  | 09/28/57 | NTS.            |
| (5) For Operation Greenhouse, the period April 5, 1951, through June 20, 1951, for all activities other than service as a member of the garrison or maintenance forces on the atoll of Enewetak between June 21, 1951, and July 1, 1952; the period of atmospheric nuclear testing for service as a member of the garrison or maintenance forces on the atoll of Enewetak shall run from April 5, 1951, through July 1, 1952: |          |                           | Nectar .....   | 05/14/54 | Enewetak. | Morgan .....  | 10/07/57 | NTS.            |
| Dog .....   | 04/08/51 | Enewetak.                 | (11) For Operation Teapot, the period February 18, 1955, through June 10, 1955:  |          |           | (15) For Operation Hardtack I, the period April 26, 1958, through October 31, 1958, for all activities other than service as a member of the garrison or maintenance forces on the atoll of Enewetak from November 1, 1958, through April 30, 1959; the period of atmospheric nuclear testing for service as a member of the garrison or maintenance forces on the atoll of Enewetak shall run from April 26, 1958, through April 30, 1959: |          |                 |
| Easy .....  | 04/21/51 | Enewetak.                 | Wasp .....   | 02/18/55 | NTS.      | Yucca .....   | 04/28/58 | Pacific.        |
| George .....  | 05/09/51 | Enewetak.                 | Moth .....   | 02/22/55 | NTS.      | Cactus .....  | 05/06/58 | Enewetak.       |
| Item .....  | 05/25/51 | Enewetak.                 | Tesla .....  | 03/01/55 | NTS.      | Fir .....   | 05/12/58 | Bikini.         |
| (6) For Operation Buster-Jangle, the period October 22, 1951, through December 20, 1951:  |          |                           | Turk .....   | 03/07/55 | NTS.      | Butternut .....   | 05/12/58 | Enewetak.       |
| Able .....  | 10/22/51 | NTS.                      | Hornet .....   | 03/12/55 | NTS.      | Koa .....   | 05/13/58 | Enewetak.       |
| Baker .....   | 10/28/51 | NTS.                      | Bee .....  | 03/22/55 | NTS.      | Wahoo .....   | 05/16/58 | Enewetak.       |
| Charlie .....   | 10/30/51 | NTS.                      | Ess .....  | 03/23/55 | NTS.      | Holly .....   | 05/21/58 | Enewetak.       |
| Dog .....   | 11/01/51 | NTS.                      | Apple-1 .....  | 03/29/55 | NTS.      | Nutmeg .....  | 05/22/58 | Bikini.         |
| Sugar .....   | 11/19/51 | NTS.                      | Wasp Prime .....   | 03/29/55 | NTS.      | Yellowwood .....  | 05/26/58 | Enewetak.       |
| Uncle .....   | 11/29/51 | NTS.                      | Ha .....   | 04/06/55 | NTS.      | Magnolia .....  | 05/27/58 | Enewetak.       |
| (7) For Operation Tumbler-Snapper, the period April 1, 1952, through June 20, 1952:   |          |                           | Post .....   | 04/09/55 | NTS.      | Tobacco .....   | 05/30/58 | Enewetak.       |
| Able .....  | 04/01/52 | NTS.                      | Met .....  | 04/15/55 | NTS.      | Sycamore .....  | 05/31/58 | Bikini.         |
| Baker .....   | 04/15/52 | NTS.                      | Apple-2 .....  | 05/05/55 | NTS.      | Rose .....  | 06/03/58 | Enewetak.       |
| Charlie .....   | 04/22/52 | NTS.                      | Zucchini .....   | 05/15/55 | NTS.      | Umbrella .....  | 06/09/58 | Enewetak.       |
| Dog .....   | 05/01/52 | NTS.                      | (12) For Operation Wigwam, the period May 14, 1955, through May 15, 1955:  |          |           | Maple .....   | 06/11/58 | Bikini.         |
| Easy .....  | 05/07/52 | NTS.                      | Wigwam .....   | 05/14/55 | Pacific.  | Aspen .....   | 06/15/58 | Bikini.         |
| Fox .....   | 05/25/52 | NTS.                      | (13) For Operation Redwing, the period May 2, 1956, through August 6, 1956, for all activities other than service as a member of the garrison or maintenance forces on the atoll of Enewetak from August 7, 1956, through August 7, 1957; the period of atmospheric nuclear testing for service as a member of the garrison or maintenance forces on the atoll of Enewetak shall run from May 2, 1956, through August 7, 1957: |          |           | Walnut .....  | 06/15/58 | Enewetak.       |
| George .....  | 06/01/52 | NTS.                      | Lacrosse .....   | 05/05/56 | Enewetak. | Linden .....  | 06/18/58 | Enewetak.       |
| (8) For Operation Ivy, the period October 29, 1952, through December 31, 1952:  |          |                           | Cherokee .....   | 05/21/56 | Bikini.   | Redwood .....   | 06/28/58 | Bikini.         |
| Mike .....  | 11/01/52 | Enewetak.                 | Zuni .....   | 05/28/56 | Bikini.   | Elder .....   | 06/28/58 | Enewetak.       |
| King .....  | 11/16/52 | Enewetak.                 | Yuma .....   | 05/28/56 | Enewetak. | Oak .....   | 06/29/58 | Enewetak.       |
| (9) For Operation Upshot-Knothole, the period March 17, 1953, through June 20, 1953:  |          |                           | Erie .....   | 05/31/56 | Enewetak. | Hickory .....   | 06/29/58 | Bikini.         |
| Annie .....   | 03/17/53 | NTS.                      | Seminole .....   | 06/06/56 | Enewetak. | Sequoia .....   | 07/02/58 | Enewetak.       |
| Nancy .....   | 03/24/53 | NTS.                      | Flathead .....   | 06/12/56 | Bikini.   | Cedar .....   | 07/03/58 | Bikini.         |
|   |          |                           | Blackfoot .....  | 06/12/56 | Enewetak. | Dogwood .....   | 07/06/58 | Enewetak.       |
|   |          |                           | Kickapoo .....   | 06/14/56 | Enewetak. | Poplar .....  | 07/12/58 | Bikini.         |
|   |          |                           | Osage .....  | 06/16/56 | Enewetak. | Scaevola .....  | 07/14/58 | Enewetak.       |
|   |          |                           | Inca .....   | 06/22/56 | Enewetak. | Pisonia .....   | 07/18/58 | Enewetak.       |
|   |          |                           | Dakota .....   | 06/26/56 | Bikini.   | Juniper .....   | 07/22/58 | Bikini.         |
|   |          |                           | Mohawk .....   | 07/03/56 | Enewetak. | Olive .....   | 07/23/58 | Enewetak.       |
|   |          |                           | Apache .....   | 07/09/56 | Enewetak. | Pine .....  | 07/27/58 | Enewetak.       |
|   |          |                           | Navajo .....   | 07/11/56 | Bikini.   | Teak .....  | 07/31/58 | Johnston Isl.   |
|   |          |                           | Tewa .....   | 07/21/56 | Bikini.   | Qunice .....  | 08/06/58 | Enewetak.       |
|   |          |                           | Huron .....  | 07/22/56 | Enewetak. | Orange .....  | 08/11/58 | Johnston Isl.   |
|   |          |                           | (14) For Operation Plumbbob, the period May 28, 1957, through October 22, 1957:  |          |           | Fig .....   | 08/18/58 | Enewetak.       |
|   |          |                           | Boltzmann .....  | 05/28/57 | NTS.      | (16) For Operation Argus, the period August 25, 1958, through September 10, 1958:   |          |                 |
|   |          |                           | Franklin .....   | 06/02/57 | NTS.      | Argus I .....   | 08/27/58 | South Atlantic. |
|   |          |                           | Lassen .....   | 06/05/57 | NTS.      | Argus II .....  | 08/30/58 | South Atlantic. |
|   |          |                           | Wilson .....   | 06/18/57 | NTS.      | Argus III .....   | 09/06/58 | South Atlantic. |
|   |          |                           | Priscilla .....  | 06/24/57 | NTS.      | (17) For Operation Hardtack II, the period September 19, 1958, through October 31, 1958:  |          |                 |
|   |          |                           | Hood .....   | 07/05/57 | NTS.      |   |          |                 |
|   |          |                           | Diablo .....   | 07/15/57 | NTS.      |   |          |                 |

| Event name       | Date     | Location |
|------------------|----------|----------|
| Eddy .....       | 09/19/58 | NTS.     |
| Mora .....       | 09/29/58 | NTS.     |
| Quay .....       | 10/10/58 | NTS.     |
| Lea .....        | 10/13/58 | NTS.     |
| Hamilton .....   | 10/15/58 | NTS.     |
| Dona Ana .....   | 10/16/58 | NTS.     |
| Rio Arriba ..... | 10/18/58 | NTS.     |
| Socorro .....    | 10/22/58 | NTS.     |
| Wrangell .....   | 10/22/58 | NTS.     |
| Rushmore .....   | 10/22/58 | NTS.     |
| Sanford .....    | 10/26/58 | NTS.     |
| De Baca .....    | 10/26/58 | NTS.     |
| Humboldt .....   | 10/29/58 | NTS.     |
| Mazama .....     | 10/29/58 | NTS.     |
| Santa Fe .....   | 10/30/58 | NTS.     |

(18) For Operation Dominic I, the period April 23, 1962, through December 31, 1962:

|                    |          |                |
|--------------------|----------|----------------|
| Adobe .....        | 04/25/62 | Christmas Isl. |
| Aztec .....        | 04/27/62 | Christmas Isl. |
| Arkansas .....     | 05/02/62 | Christmas Isl. |
| Questa .....       | 05/04/62 | Christmas Isl. |
| Frigate Bird ..... | 05/06/62 | Pacific.       |
| Yukon .....        | 05/08/62 | Christmas Isl. |
| Mesilla .....      | 05/09/62 | Christmas Isl. |
| Muskegon .....     | 05/11/62 | Christmas Isl. |
| Swordfish .....    | 05/11/62 | Pacific.       |
| Encino .....       | 05/12/62 | Christmas Isl. |
| Swanee .....       | 05/14/62 | Christmas Isl. |
| Chetco .....       | 05/19/62 | Christmas Isl. |
| Tanana .....       | 05/25/62 | Christmas Isl. |
| Nambe .....        | 05/27/62 | Christmas Isl. |
| Alma .....         | 06/08/62 | Christmas Isl. |
| Truckee .....      | 06/09/62 | Christmas Isl. |
| Yeso .....         | 06/10/62 | Christmas Isl. |
| Harlem .....       | 06/12/62 | Christmas Isl. |
| Rinconada .....    | 06/15/62 | Christmas Isl. |
| Dulce .....        | 06/17/62 | Christmas Isl. |
| Petit .....        | 06/19/62 | Christmas Isl. |
| Otowi .....        | 06/22/62 | Christmas Isl. |
| Bighorn .....      | 06/27/62 | Christmas Isl. |
| Bluestone .....    | 06/30/62 | Christmas Isl. |
| Starfish .....     | 07/08/62 | Johnston Isl.  |
| Sunset .....       | 07/10/62 | Christmas Isl. |
| Pamlico .....      | 07/11/62 | Christmas Isl. |
| Androscoggin ...   | 10/02/62 | Johnston Isl.  |
| Bumping .....      | 10/06/62 | Johnston Isl.  |
| Chama .....        | 10/18/62 | Johnston Isl.  |
| Checkmate .....    | 10/19/62 | Johnston Isl.  |
| Bluegill .....     | 10/25/62 | Johnston Isl.  |
| Calamity .....     | 10/27/62 | Johnston Isl.  |

| Event name   | Date     | Location      |
|--|----------|---------------|
| Housatonic .....   | 10/30/62 | Johnston Isl. |
| Kingfish .....   | 11/01/62 | Johnston Isl. |
| Tightrope .....  | 11/03/62 | Johnston Isl. |
| (19) For Operation Dominic II, the period July 7, 1962, through August 15, 1962: |          |               |
| Little Feller II ..  | 07/07/62 | NTS.          |
| Johnie Boy .....   | 07/11/62 | NTS.          |
| Small Boy .....  | 07/14/62 | NTS.          |
| Little Feller I ....   | 07/17/62 | NTS.          |

(20) For Operation Plowshare, the period July 6, 1962, through July 7, 1962, covering Project Sedan.

#### **§ 79.32 Criteria for eligibility for claims by onsite participants.**

To establish eligibility for compensation under this subpart, a claimant or eligible surviving beneficiary must establish each of the following:

(a) That the claimant was present onsite at any time during a period of atmospheric nuclear testing;

(b) That the claimant was a participant during that period in the atmospheric detonation of a nuclear device; and

(c) That after such participation, the claimant contracted a specified compensable disease as set forth in § 79.22(b).

#### **§ 79.33 Proof of participation onsite during a period of atmospheric nuclear testing.**

(a) *Claimants associated with Department of Defense (DoD) Components or DoD Contractors.* (1) A claimant or eligible surviving beneficiary who alleges that the claimant was present onsite during a period of atmospheric nuclear testing as a member of the armed forces or an employee or contractor employee of the DoD, or any of its components or agencies, must submit the following information on the claim form:

- (i) The claimant's name;
- (ii) The claimant's military service number;
- (iii) The claimant's Social Security number;
- (iv) The site at which the claimant participated in the atmospheric detonation of a nuclear device;
- (v) The name or number of the claimant's military organization or unit assignment at the time of his or her onsite participation;
- (vi) The dates of the claimant's assignment onsite; and
- (vii) As full and complete a description as possible of the claimant's official duties, responsibilities, and activities while participating onsite.

(2) A claimant or eligible surviving beneficiary under this section need not submit any additional documentation of

onsite participation during the atmospheric detonation of a nuclear device at the time the claim is filed; however, additional documentation may be required as set forth in paragraph (a)(3) of this section.

(3) Upon receipt under this subpart of a claim that contains the information set forth in paragraph (a)(1) of this section, the Radiation Exposure Compensation Program will forward the information to the DoD and request that the DoD conduct a search of its records for the purpose of gathering facts relating to the claimant's presence onsite and participation in the atmospheric detonation of a nuclear device. If the facts gathered by the DoD are insufficient to establish the eligibility criteria in § 79.32, the claimant or eligible surviving beneficiary will be notified and afforded the opportunity to submit military, government, or business records in accordance with the procedure set forth in § 79.72(c).

(b) *Claimants Associated with the Atomic Energy Commission (AEC) or the Department of Energy (DOE), or Who Were Members of the Federal Civil Defense Administration or the Office of Civil and Defense Mobilization.* (1) A claimant or eligible surviving beneficiary who alleges that the claimant was present onsite during the atmospheric detonation of a nuclear device as an employee of the AEC, the DOE or any of their components, agencies or offices, or as an employee of a contractor of the AEC, or DOE, or as a member of the Federal Civil Defense Administration or the Office of Civil and Defense Mobilization, must submit the following information on the claim form:

- (i) The claimant's name;
- (ii) The claimant's Social Security number;
- (iii) The site at which the claimant participated in the atmospheric detonation of a nuclear device;
- (iv) The name or other identifying information associated with the claimant's organization, unit, assignment, or employer at the time of the claimant's participation onsite;
- (v) The dates of the claimant's assignment onsite; and
- (vi) As full and complete a description as possible of the claimant's official duties, responsibilities, and activities while participating onsite.

(2) A claimant or eligible surviving beneficiary under this section need not at the time the claim is filed submit any additional documentation demonstrating the claimant's presence onsite during the atmospheric detonation of a nuclear device; however, additional documentation may

thereafter be required as set forth in paragraph (b)(3) of this section.

(3) Upon receipt under this subpart of a claim that contains the information set forth in paragraph (b)(1) of this section, the Radiation Exposure Compensation Program will forward the information to the Nevada Field Office of the Department of Energy (DOE/NV) and request that the DOE/NV conduct a search of its records for the purpose of gathering facts relating to the claimant's presence onsite and participation in the atmospheric detonation of a nuclear device. If the facts gathered by the DOE/NV are insufficient to establish the eligibility criteria in § 79.32, the claimant or eligible surviving beneficiary will be notified and afforded the opportunity to submit military, government, or business records in accordance with the procedure set forth in § 79.72(c).

#### **§ 79.34 Proof of medical condition.**

Proof of medical condition under this subpart will be made in the same manner and according to the same procedures and limitations as are set forth in § 79.16 and § 79.26.

#### **§ 79.35 Proof of onset of leukemia at least two years after first exposure, and proof of onset of a specified compensable disease more than five years after first exposure.**

Absent any indication to the contrary, the earliest date of onsite participation indicated on any records accepted by the Radiation Exposure Compensation Program as proof of the claimant's onsite participation will be presumed to be the date of first or initial exposure. The date of onset will be the date of diagnosis as indicated on the medical documentation accepted by the Radiation Exposure Compensation Program as proof of the specified compensable disease. Proof of the onset of leukemia shall be established in accordance with § 79.15.

#### **§ 79.36 Indication of the presence of hepatitis B or cirrhosis.**

Possible indication of hepatitis B or cirrhosis will be determined in accordance with the provisions of § 79.27.

### **Subpart E—Eligibility Criteria for Claims by Uranium Miners**

#### **§ 79.40 Scope of subpart.**

The regulations in this subpart define the eligibility criteria for compensation under section 5 of the Act pertaining to miners, *i.e.*, uranium mine workers, and the nature of the evidence that will be accepted as proof of the various eligibility criteria. Section 5 of the Act provides for a payment of \$100,000 to

miners who contracted primary lung cancer or one of a limited number of nonmalignant respiratory diseases following exposure to a defined minimum level of radiation during employment in aboveground or underground uranium mines or following employment for at least one year in aboveground or underground uranium mines in specified states during the period beginning January 1, 1942, and ending December 31, 1971.

#### **§ 79.41 Definitions.**

(a) *Cor pulmonale* means heart disease, including hypertrophy of the right ventricle, due to pulmonary hypertension secondary to fibrosis of the lung.

(b) *Designated time period* means the period beginning on January 1, 1942, and ending on December 31, 1971.

(c) *Employment for at least one year* means employment for a total of at least one year (12 consecutive or cumulative months).

(d) *Fibrosis of the lung or pulmonary fibrosis* means chronic inflammation and scarring of the pulmonary interstitium and alveoli with collagen deposition and progressive thickening.

(e) *Miner or uranium mine worker* means a person who operated or otherwise worked in a uranium mine.

(f) *National Institute for Occupational Safety and Health (NIOSH) certified "B" reader* means a physician who is certified as such by NIOSH. A list of certified "B" readers is available from the Radiation Exposure Compensation Program upon request.

(g) *Nonmalignant respiratory disease* means fibrosis of the lung, pulmonary fibrosis, *cor pulmonale* related to fibrosis of the lung, silicosis, or pneumoconiosis.

(h) *Pneumoconiosis* means a chronic lung disease resulting from inhalation and deposition in the lung of particulate matter, and the tissue reaction to the presence of the particulate matter. For purposes of this subpart, the claimant's exposure to the particulate matter that led to the disease must have occurred during employment in a uranium mine.

(i) *Primary lung cancer* means any physiological condition of the lung, trachea, or bronchus that is recognized under that name or nomenclature by the National Cancer Institute. The term includes *in situ* lung cancers.

(j) *Readily available documentation* means documents in the possession, custody, or control of the claimant or an immediate family member.

(k) *Silicosis* means a pneumoconiosis due to the inhalation of the dust of stone, sand, flint, or other materials containing silicon dioxide,

characterized by the formation of pulmonary fibrotic changes.

(l) *Specified state* means Colorado, New Mexico, Arizona, Wyoming, South Dakota, Washington, Utah, Idaho, North Dakota, Oregon, or Texas. Additional states may be included, provided:

(1) A uranium mine was operated in such state at any time during the period beginning on January 1, 1942, and ending on December 31, 1971;

(2) The state submits an application to the Assistant Director (specified in § 79.70(a)) to include such state; and

(3) The Assistant Director makes a determination to include such state.

(m) *Uranium mine* means any underground excavation, including "dog holes," as well as open-pit, strip, rim, surface, or other aboveground mines, where uranium ore or vanadium-uranium ore was mined or otherwise extracted.

(n) *Working level* means the concentration of the short half-life daughters of radon that will release ( $1.3 \times 10^5$ ) million electron volts of alpha energy per liter of air.

(o) *Working level month of radiation* means radiation exposure at the level of one working level every work day for a month, or an equivalent cumulative exposure over a greater or lesser amount of time.

(p) *Written diagnosis by a physician* means a written determination of the nature of a disease made from a study of the signs and symptoms of a disease that is based on a physical examination of the patient, medical imaging or a chemical, microscopic, microbiologic, immunologic or pathologic study of physiologic and functional tests, secretions, discharges, blood, or tissue. For purposes of satisfying the requirement of a "written diagnosis by a physician" for living claimants specified in § 79.46, a physician submitting a written diagnosis of a nonmalignant respiratory disease must be employed by the Indian Health Service or the Department of Veterans Affairs or be board certified, and must have a documented, ongoing physician-patient relationship with the claimant. An "ongoing physician-patient relationship" can include referrals made to specialists from a primary care provider for purposes of diagnosis or treatment. "Board certification" requires, in addition to physician licensing, the successful completion of a residency training program and passage of a Board exam in a relevant field or specialty. Relevant specialties include: family practice, internal medicine, pathology, preventive medicine, radiology, surgery, and thoracic surgery (and including

subspecialties such as cardiovascular disease, medical oncology, pulmonary disease) as listed by the American Board of Medical Specialties.

**§ 79.42 Criteria for eligibility for claims by miners.**

To establish eligibility for compensation under this subpart, a claimant or eligible surviving beneficiary must establish each of the following:

- (a) The claimant was employed as a miner in a specified state;
- (b) The claimant was so employed at any time during the period beginning on January 1, 1942, and ending on December 31, 1971;
- (c) The claimant was exposed during the course of his or her mining employment to 40 or more working level months of radiation or worked for at least one year in a uranium mine or mines during the period identified in paragraph (b) of this section; and
- (d) The claimant contracted lung cancer or a nonmalignant respiratory disease following such exposure.

**§ 79.43 Proof of employment as a miner.**

(a) The Department will accept, as proof of employment for a designated time period, information contained in any of the following records:

- (1) Records created by or gathered by the Public Health Service (PHS) in the course of any health studies of uranium workers during or including the period 1942–1990;
- (2) Records of a uranium worker census performed by the PHS at various times during the period 1942–1990;
- (3) Records of the Atomic Energy Commission (AEC), or any of its successor agencies; and
- (4) Records of federally supported, health-related studies of uranium workers, including:
  - (i) Studies conducted by Geno Saccamanno, M.D., St. Mary's Hospital, Grand Junction, Colorado; and
  - (ii) Studies conducted by Jonathan Samet, M.D., University of New Mexico School of Medicine.

(b) The Program will presume that the employment history for the time period indicated in records listed in paragraph (a) of this section is correct. If the claimant or eligible surviving beneficiary wishes to contest the accuracy of such records, then the claimant or eligible surviving beneficiary may provide one or more of the records identified in paragraph (c) of this section, and the Assistant Director will determine whether the employment history indicated in the records listed in paragraph (a) is correct.

(c) If the sources in paragraph (a) of this section do not contain information

regarding the claimant's uranium mine employment history, do not contain sufficient information to establish exposure to at least 40 working level months of radiation, do not contain sufficient information to establish uranium mining employment for one year during the period identified in § 79.42(b), or if a claimant or eligible surviving beneficiary wishes to contest the accuracy of such records, then the claimant or eligible surviving beneficiary may submit records from any of the following sources, and the Assistant Director shall consider such records (in addition to any sources listed in paragraph (a) of this section) in order to determine whether the claimant has established the requisite employment history:

- (1) Governmental records of any of the specified states, including records of state regulatory agencies, containing information on uranium mine workers and uranium mines;
- (2) Records of any business entity that owned or operated a uranium mine, or its successor-in-interest;
- (3) Records of the Social Security Administration reflecting the identity of the employer, the years and quarters of employment, and the wages received during each quarter;
- (4) Federal or State income tax records that contain relevant statements regarding the claimant's employer and wages;
- (5) Records containing factual findings by any governmental judicial body, state worker's compensation board, or any governmental administrative body adjudicating the claimant's rights to any type of benefits (which will be accepted only to prove the fact of and duration of employment in a uranium mine);
- (6) Statements in medical records created during the period 1942–1971 indicating or identifying the claimant's employer and occupation;
- (7) Records of an academic or scholarly study, not conducted in anticipation of or in connection with any litigation, and completed prior to 1990; and
- (8) Any other contemporaneous record that indicates or identifies the claimant's occupation or employer.

(d) To the extent that the documents submitted from the sources identified in this section do not so indicate, the claimant or eligible surviving beneficiary must set forth under oath on the standard claim form the following information, if known:

- (1) The names of the mine employers for which the claimant worked during the time period identified in the documents;

(2) The names and locations of any mines in which the claimant worked;

(3) The actual time period the claimant worked in each mine;

(4) The claimant's occupation in each mine; and

(5) Whether the mining employment was conducted aboveground or underground.

(e) If the claimant or eligible surviving beneficiary cannot provide the name or location of any uranium mine at which the claimant was employed as required under paragraph (d)(2) of this section, then the Program shall, if possible, determine such information from records reflecting the types of mines operated or owned by the entity for which the claimant worked.

(f) If the information provided under paragraphs (a) and (c) of this section is inadequate to determine the time period during which the claimant was employed in each uranium mine, then the Program will, where possible, calculate such employment periods in the following manner, for purposes of calculating working level months of exposure:

(1) If records of the Social Security Administration exist that indicate the claimant's work history, the Program will estimate the period of employment by dividing the gross quarterly income by the average pay rate per hour for the claimant's occupation;

(2) If such Social Security Administration records do not exist, but other records exist that indicate that the claimant was employed in a uranium mine on the date recorded in the record, but do not indicate the period of employment, then the Program will apply the following presumptions:

(i) If the records indicate that the claimant worked at the same mine or for the same uranium mining company on two different dates at least three months apart but less than 12 months apart, then the Program will presume that the claimant was employed at the mine or for the mining company for the entire 12-month period beginning on the earlier date.

(ii) If the records indicate that the claimant worked at the same mine or for the same uranium mining company on two different dates at least one month apart but less than three months apart, then the Program will presume that the claimant was employed at the mine or for the mining company for the entire six-month period beginning on the earlier date.

(iii) If the records indicate that the claimant worked at any mine or for a uranium mining company on any date within the designated time period, but the presumptions listed in this

paragraph (f) are not applicable, then the Program will presume that the claimant was employed at the mine or for the mining company for a six-month period, consisting of three months before and three months after the date indicated.

(g) In determining whether a claimant satisfies the employment and exposure criteria of the Act, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. If the Assistant Director concludes that the claimant has not satisfied the employment or exposure requirements of the Act, the claimant or eligible surviving beneficiary will be notified and afforded the opportunity, in accordance with the provisions of § 79.72(c), to submit additional records to establish that the statutory criteria are satisfied.

**§ 79.44 Proof of working level month exposure to radiation.**

(a) If one or more of the sources in § 79.43(a) contain a calculated total of working level months (WLMs) of radiation for the claimant equal to or greater than 40 WLMs, then the Program will presume that total to be correct, absent evidence to the contrary, in which case the claimant or eligible surviving beneficiary need not submit additional records.

(b) If the sources in § 79.43(a) do not contain a calculated total of WLMs of radiation for the claimant, or contain a calculated total that is less than 40 WLMs, a claimant or eligible surviving beneficiary may submit the following records reflecting a calculated number of WLMs of radiation for periods of employment established under § 79.43(c):

(1) Certified copies of records of regulatory agencies of the specified states, provided that the records indicate the mines at which the claimant was employed, the time period of the claimant's employment in each mine, the exposure level in each mine during the claimant's employment, and the calculations on which the claimant's WLMs are based, unless the calculation is apparent;

(2) Certified copies of records of the owner or operator of a uranium mine in the specified states, provided that the records indicate the mines at which the claimant was employed, the time period of the claimant's employment in each mine, the exposure level in each mine during the claimant's employment, and the calculations on which the claimant's WLMs are based, unless the calculation is apparent.

(c) If the number of WLMs established under paragraphs (a) and (b) of this section is equal to or greater than 40

WLMs of radiation, the claimant or eligible surviving beneficiary need not submit additional records. When the sources referred to in paragraphs (a) and (b) of this section do not establish a calculated number of at least 40 WLMs, the Program will, where possible, calculate additional WLMs in the manner set forth in paragraphs (d) through (g) of this section for the periods of employment for which the sources in paragraphs (a) and (b) do not establish calculated totals. When calculating an exposure level for a particular period of a claimant's employment history, the Program will apply aboveground exposure levels with respect to those periods in which the claimant worked principally aboveground and will apply underground exposure levels with respect to those periods in which the claimant worked principally underground.

(d) To the extent the sources referenced in paragraphs (a) and (b) of this section do not contain a calculated number of WLMs, but do contain annual exposure levels measured in Working Levels (WLs) for mines in which the claimant was employed, the Program will calculate the claimant's exposure to radiation measured in WLMs in the manner set forth in paragraph (h) of this section.

(e) For periods of employment in a uranium mine that a claimant establishes under § 79.43(c) as to which paragraph (d) of this section is not applicable, the Program will, where possible, use any or all of the following sources in computing the annual exposure level measured in WLs in each mine for the period of the claimant's employment, in the manner set forth in paragraph (g) of this section:

(1) Records of the AEC, or its successor agencies;

(2) Records of the PHS, including radiation-level measurements taken in the course of health studies conducted of uranium miners during or including the period 1942–1971;

(3) Records of the United States Bureau of Mines;

(4) Records of regulatory agencies of the specified states; or

(5) Records of the business entity that was the owner or operator of the mine.

(f) For periods of employment in unidentified or misidentified uranium mines that a claimant establishes under § 79.43(c) through (f), the Program will determine annual exposure levels measured in WLs in the unidentified or misidentified mines by calculating an average of the annual exposure levels measured in WLs in all the uranium mines owned or operated by the entities

for which the claimant worked during the appropriate time periods and in the identified states.

(g) With respect to periods of employment in a uranium mine that a claimant establishes under § 79.43(c) as to which paragraph (d) of this section is not applicable, and periods of employment in unidentified or misidentified uranium mines that a claimant establishes under § 79.43(c) through (f), the Program will use the following methodology to calculate the annual exposure level measured in WLs for each mine:

(1) If one or more radiation measurements are available for a mine in a given year, such values will be averaged to generate the WLs for the mine for that year.

(2) If radiation measurements exist for the mine, but not for the year in which the claimant was employed in the mine, the WLs for the mine for that year will be estimated if possible as follows:

(i) If annual average measurements exist within four years of the year in which the claimant was employed in the mine, the measurements for the two closest years will be averaged, and that value will be assigned to the year the claimant was employed in the mine;

(ii) If one or more annual average measurements exist for a mine, but are not more than five years from the year the claimant was employed, the annual average closest in time will be assigned either forward or backward in time for two years.

(3) If the methods described in paragraph (g)(2) of this section interpolate or project the annual exposure level measured in WLs for a mine in a year in which the claimant was employed in the mine, the Program will use an estimated average for mines of the same or similar type, ventilation, and ore composition in the same geographical area for that year. An estimated area average will be calculated as follows:

(i) If actual measurements from three or more mines of the same or similar type, ventilation, and ore composition are available from mines in the same locality as the mine in which the claimant was employed, the average of the measurements for the mines within that locality will be used.

(ii) If there are insufficient actual measurements from mines in the same locality to use the method in paragraph (g)(3)(i) of this section, an average of exposure levels in mines in the same mining district will be used.

(iii) If there is no average of exposure levels from mines in the same mining district, the average of exposure levels in mines in the same state will be used.

(iv) If there are insufficient actual measurements from mines in the same state, the estimated average for the State of Colorado for the relevant year will be used.

(4) With respect to a year between 1942 and 1949, if the claimant was employed in a mine for which no exposure levels are available for that year, then the Program will estimate the annual exposure levels measured in WLs by averaging the two earliest exposure levels recorded from that mine after the year 1941. If there are not two exposure levels recorded from that mine, the Program will estimate the WLs by averaging the two earliest exposure levels after the year 1941 from the mines identified according to the methods set forth in paragraphs (g)(3)(i) through (iv).

(h) The Program will calculate a claimant's total exposure to radiation expressed in WLMs, for purposes of establishing eligibility under § 79.42(c), by adding together the WLMs for each period of employment that the claimant has established. For those periods of a claimant's employment for which the Program has obtained or calculated WLs pursuant to paragraphs (d) through (g) of this section, the Program shall determine WLMs by multiplying the WL by the pertinent time period, measured in months, yielding a claimant's exposure to radiation expressed in WLMs.

(i) In addition to any other material that may be used to substantiate employment history for purposes of determining WLMs, an individual filing a claim may make such a substantiation by means of an affidavit described in § 79.4(c)(4).

#### **§ 79.45 Proof of primary lung cancer.**

(a) In determining whether a claimant developed primary lung cancer following pertinent employment as a miner, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed primary lung cancer must be supported by medical documentation. To prove that a claimant developed primary lung cancer, the claimant or beneficiary may submit any form of medical documentation specified in paragraph (e) of this section. In all cases, the Program will review submitted medical documentation, and will, in addition and where appropriate, review any pertinent records discovered within the sources identified in paragraphs (b), (c), and (d) of this section.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including

NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. (In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary lung cancer.)

(c) If a claimant was diagnosed as having primary lung cancer in Arizona, Colorado, Nevada, New Mexico, Utah, or Wyoming, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information, valid in the state of diagnosis, that authorizes the Radiation Exposure Compensation Program to contact the appropriate state cancer or tumor registry, the Program will, where appropriate, request the relevant information from that registry and will review records that it obtains from the registry. (In cases where the claimant is deceased, the Program will accept as proof of medical condition verification from the state cancer or tumor registry that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary lung cancer.)

(d) If medical records regarding the claimant were gathered during the course of any federally supported, health-related study of uranium workers, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. (In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of primary lung cancer.)

(e)(1) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted primary lung cancer. Such documentation will be most useful where it contains an explicit statement of diagnosis or such other information or data from which the appropriate authorities at the National Cancer

Institute can make a diagnosis to a reasonable degree of medical certainty:

(i) Pathology report of tissue biopsy, including, but not limited to, specimens obtained by any of the following methods:

(A) Surgical resection;  
(B) Endoscopic endobronchial or transbronchial biopsy;  
(C) Bronchial brushings and washings;

(D) Pleural fluid cytology;  
(E) Fine needle aspirate;  
(F) Pleural biopsy; or  
(G) Sputum cytology;

(ii) Autopsy report;

(iii) Bronchoscopy report;

(iv) One of the following summary

medical reports:

(A) Physician summary report;  
(B) Hospital discharge summary report;  
(C) Operative report;

(D) Radiation therapy summary

report; or

(E) Oncology summary or consultation report;

(v) Reports of radiographic studies, including:

(A) X-rays of the chest;

(B) Chest tomograms;

(C) Computer-assisted tomography (CT); or

(D) Magnetic resonance imaging (MRI); or

(vi) Death certificate, provided that it is signed by a physician at the time of death.

#### **§ 79.46 Proof of nonmalignant respiratory disease.**

(a) In determining whether a claimant developed a nonmalignant respiratory disease following pertinent employment as a miner, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed a nonmalignant respiratory disease must be supported by medical documentation. In cases where the claimant is deceased, the claimant's beneficiary may submit any form of medical documentation specified in paragraph (d)(1) of this section, and for proof of cor pulmonale must also submit one or more forms of documentation specified in paragraph (d)(2). A living claimant must at a minimum submit the medical documentation required in paragraph (d)(3) of this section, and for proof of cor pulmonale must also submit one or more forms of documentation specified in paragraph (d)(2). In all cases, the Program will review submitted medical documentation, and will, in addition and where appropriate, review any pertinent records discovered within the sources referred to in paragraphs (b) and

(c) of this section. With respect to a deceased claimant, the Program will treat as equivalent to a diagnosis of pulmonary fibrosis any diagnosis of "restrictive lung disease" made by a physician employed by the Indian Health Service.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of a nonmalignant respiratory disease.

(c) If medical records regarding the claimant were gathered during the course of any federally supported, health-related study of uranium workers and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of a nonmalignant respiratory disease.

(d) (1) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted a nonmalignant respiratory disease, including pulmonary fibrosis, fibrosis of the lung, cor pulmonale related to fibrosis of the lung, silicosis, and pneumoconiosis:

- (i) Pathology report of tissue biopsy;
- (ii) Autopsy report;
- (iii) If an x-ray exists, the x-ray and interpretive reports of the x-ray by a maximum of two NIOSH certified "B" readers classifying the existence of disease of category 1/0 or higher according to a 1989 report of the International Labor Office (known as the "ILO"), or subsequent revisions;
- (iv) If no x-rays exist, an x-ray report;
- (v) Physician summary report;
- (vi) Hospital discharge summary report;

(vii) Hospital admitting report;

(viii) Death certificate, provided that it is signed by a physician at the time of death; or

(ix) Documentation specified in paragraphs (d)(3)(i) and (d)(3)(ii) of this section.

(2) In order to demonstrate that the claimant developed cor pulmonale related to fibrosis of the lung, the claimant or beneficiary must, at a minimum, submit one or more of the following medical records:

- (i) Right heart catheterization;
- (ii) Cardiology summary or consultation report;
- (iii) Electrocardiogram;
- (iv) Echocardiogram;
- (v) Physician summary report;
- (vi) Hospital discharge summary report;
- (vii) Autopsy report;
- (viii) Report of physical examination; or

(ix) Death certificate, provided that it is signed by a physician at the time of death.

(3) Notwithstanding any other documentation provided, a living claimant must at a minimum provide the following medical documentation:

- (i) Either:
  - (A) An arterial blood gas study administered at rest in a sitting position, or an exercise arterial blood gas test, reflecting values equal to or less than the values set forth in the tables in appendix B to this part; or

(B) A written diagnosis by a physician in accordance with § 79.41(p); and

- (ii) One of the following:

(A) A chest x-ray administered in accordance with standard techniques accompanied by interpretive reports of the x-ray by a maximum of two NIOSH certified "B" readers, classifying the existence of disease of category 1/0 or higher according to a 1989 report of the International Labor Office (known as the "ILO"), or subsequent revisions;

(B) High-resolution computed tomography scans (commonly known as "HRCT scans"), including computer-assisted tomography scans (commonly known as "CAT scans"), magnetic resonance imaging scans (commonly known as "MRI scans"), and positron emission tomography scans (commonly known as "PET scans"), and interpretive reports of such scans;

(C) Pathology reports of tissue biopsies; or

(D) Pulmonary function tests indicating restrictive lung function and consisting of three reproducible time/volume tracings recording the results of the forced expiratory volume in one second (FEV1) and the forced vital capacity (FVC) administered and

reported in accordance with the Standardization of Spirometry—1994 Update by the American Thoracic Society, and reflecting values for FEV1 or FVC that are less than or equal to the lower limit of normal for an individual of the claimant's age, sex, height, and ethnicity as set forth in the tables in appendix A to this part.

(e) The Assistant Director shall treat any documentation described in paragraph (d)(3)(i)(B) or paragraph (d)(3)(ii)(A) of this section as conclusive evidence of the claimant's nonmalignant respiratory disease; provided, however, that the Program may subject such documentation to a fair and random audit to guarantee its authenticity and reliability for purposes of treating it as conclusive evidence; and provided further that, in order to be treated as conclusive evidence, a written diagnosis described in paragraph (d)(3)(i)(B) must be by a physician who is employed by the Indian Health Service or the Department of Veterans Affairs or who is board certified (as described in § 79.41(p)), and who must have a documented, ongoing physician-patient relationship with the claimant. Notwithstanding the conclusive effect given to certain evidence, nothing in this paragraph shall be construed as relieving a living claimant of the obligation to provide the Program with the forms of documentation required under paragraph (d)(3).

## Subpart F—Eligibility Criteria for Claims by Uranium Millers

### § 79.50 Scope of subpart.

The regulations in this subpart define the eligibility criteria for compensation under section 5 of the Act pertaining to millers, *i.e.*, uranium mill workers, and the nature of evidence that will be accepted as proof that a claimant satisfies such eligibility criteria. Section 5 of the Act provides for a payment of \$100,000 to "millers" who contracted primary lung cancer, one of a limited number of nonmalignant respiratory diseases, primary renal cancer, or chronic renal disease, following employment for at least one year as a uranium mill worker in specified states during the period beginning January 1, 1942, and ending December 31, 1971.

### § 79.51 Definitions.

(a) *Chronic renal disease* means the chronic, progressive, and irreversible destruction of the nephron. It is exhibited by diminution of renal function.

(b) *Cor pulmonale* means heart disease, including hypertrophy of the right ventricle, due to pulmonary



hypertension secondary to fibrosis of the lung.

(c) *Designated time period* means the period beginning on January 1, 1942, and ending on December 31, 1971.

(d) *Employment for at least one year* means employment for a total of at least one year (12 consecutive or cumulative months).

(e) *Fibrosis of the lung or pulmonary fibrosis* means chronic inflammation and scarring of the pulmonary interstitium and alveoli with collagen deposition and progressive thickening.

(f) *Kidney tubal (tubular) tissue injury* means structural or functional damage to the kidney tubules that results in renal disease and dysfunction.

(g) *Miller or uranium mill worker* means a person who operated or otherwise worked in a uranium mill.

(h) *National Institute for Occupational Safety and Health (NIOSH) certified "B" reader* means a physician who is certified as such by NIOSH. A list of certified "B" readers is available from the Radiation Exposure Compensation Program upon request.

(i) *Nephritis* means an inflammatory process of the kidneys resulting in chronic renal dysfunction.

(j) *Nonmalignant respiratory disease* means fibrosis of the lung, pulmonary fibrosis, cor pulmonale related to fibrosis of the lung, silicosis, and pneumoconiosis.

(k) *Pneumoconiosis* means a chronic lung disease resulting from inhalation and deposition in the lung of particulate matter, and the tissue reaction to the presence of the particulate matter. For purposes of this subpart, the claimant's exposure to the particulate matter that led to the disease must have occurred during employment in a uranium mill.

(l) *Primary lung cancer* means any physiological condition of the lung, trachea, or bronchus that is recognized under that name or nomenclature by the National Cancer Institute. The term includes in situ lung cancers.

(m) *Readily available documentation* means documents in the possession, custody, or control of the claimant or an immediate family member.

(n) *Primary renal cancer* means any physiological condition of the kidneys that is recognized under that name or nomenclature by the National Cancer Institute.

(o) *Silicosis* means a pneumoconiosis due to the inhalation of the dust of stone, sand, flint, or other materials containing silicon dioxide, characterized by the formation of pulmonary fibrotic changes.

(p) *Specified state* means Colorado, New Mexico, Arizona, Wyoming, South Dakota, Washington, Utah, Idaho, North

Dakota, Oregon, or Texas. Additional states may be included, provided:

(1) A uranium mine was operated in such state at any time during the period beginning on January 1, 1942, and ending on December 31, 1971;

(2) The state submits an application to the Assistant Director (specified in § 79.70(a)) to include such state; and

(3) The Assistant Director makes a determination to include such state.

(q) *Uranium mill* means any milling operation involving the processing of uranium ore or vanadium-uranium ore, including carbonate plants and acid leach plants. The term applies to ore-buying stations where ore was weighed and sampled prior to delivery to a mill for processing; "upgrader" or "concentrator" facilities located at the mill or at a remote location where uranium or vanadium-uranium ore was processed prior to delivery to a mill; and pilot plants where uranium ore or vanadium-uranium ore was processed.

(r) *Uranium mine* means any underground excavation, including "dog holes," as well as open-pit, strip, rim, surface, or other aboveground mines, where uranium ore or vanadium-uranium ore was mined or otherwise extracted.

(s) *Written diagnosis by a physician* means a written determination of the nature of a disease made from a study of the signs and symptoms of a disease that is based on a physical examination of the patient, medical imaging or a chemical, microscopic, microbiologic, immunologic, or pathologic study of physiologic and functional tests, secretions, discharges, blood, or tissue. For purposes of satisfying the requirement of a "written diagnosis by a physician" for living claimants specified in § 79.55, a physician submitting a written diagnosis of a nonmalignant respiratory disease must be employed by the Indian Health Service or the Department of Veterans Affairs or be board certified, and must have a documented, ongoing physician-patient relationship with the claimant. An "ongoing physician-patient relationship" can include referrals made to specialists from a primary care provider for purposes of diagnosis or treatment. "Board certification" requires, in addition to physician licensing, the successful completion of a residency training program and passage of a Board exam in a relevant field or specialty. Relevant specialties include: family practice, internal medicine, pathology, preventive medicine, radiology, surgery, and thoracic surgery (and including subspecialties such as cardiovascular disease, medical oncology, pulmonary

disease) as listed by the American Board of Medical Specialties.

#### **§ 79.52 Criteria for eligibility for claims by uranium millers.**

To establish eligibility for compensation under this subpart, a claimant or eligible surviving beneficiary of a claimant must establish each of the following:

(a) The claimant was employed as a miller in a specified state;

(b) The claimant was so employed for at least one year (12 consecutive or cumulative months) during the period beginning on January 1, 1942, and ending on December 31, 1971; and

(c) The claimant contracted primary lung cancer, a nonmalignant respiratory disease, primary renal cancer, or chronic renal disease (including nephritis and kidney tubal tissue injury) following at least one year of such employment.

#### **§ 79.53 Proof of employment as a miller.**

(a) The Department will accept, as proof of employment for the time period indicated, information contained in any of the following records:

(1) Records created by or gathered by the Public Health Service (PHS) in the course of any health studies of uranium workers during or including the period 1942–1990;

(2) Records of a uranium worker census performed by the PHS at various times during the period 1942–1990;

(3) Records of the Atomic Energy Commission (AEC), or any of its successor agencies; and

(4) Records of federally supported, health-related studies of uranium workers.

(b) The Program will presume that the employment history for the time period indicated in records listed in paragraph (a) of this section is correct. If the claimant or eligible surviving beneficiary wishes to contest the accuracy of such records, then the claimant or eligible surviving beneficiary may provide one or more of the records identified in paragraph (c) of this section, and the Assistant Director will determine whether the employment history indicated in the records listed in paragraph (a) is correct.

(c) If the sources in paragraph (a) of this section do not contain information regarding the claimant's uranium mill employment history, do not contain sufficient information to establish employment for at least one year in a uranium mill during the specified time period to qualify under § 79.52(b), or if a claimant or eligible surviving beneficiary wishes to contest the accuracy of such records, then the

claimant or eligible surviving beneficiary may submit records from any of the following sources, which the Assistant Director shall consider (in addition to any sources listed in paragraph (a) of this section) in order to determine whether the claimant has established the requisite employment history:

(1) Records of any of the specified states, including records of state regulatory agencies, containing information on uranium mill workers and uranium mills;

(2) Records of any business entity that owned or operated a uranium mill, or its successor-in-interest;

(3) Records of the Social Security Administration reflecting the identity of the employer, the years and quarters of employment, and the wages received during each quarter;

(4) Federal or state income tax records that contain relevant statements regarding the claimant's employer and wages;

(5) Records containing factual findings by any governmental judicial body, state worker's compensation board, or any governmental administrative body adjudicating the claimant's rights to any type of benefits (which will be accepted only to prove the fact of and duration of employment in a uranium mill);

(6) Statements in medical records created during the period 1942–1971 indicating or identifying the claimant's employer and occupation;

(7) Records of an academic or scholarly study, not conducted in anticipation of or in connection with any litigation, and completed prior to 1990; or

(8) Any other contemporaneous record that indicates or identifies the claimant's occupation or employer.

(d) To the extent that the documents submitted from the sources identified in this section do not so indicate, the claimant or eligible surviving beneficiary must set forth under oath on the standard claim form the following information, if known:

(1) The names of the mill employers for which the claimant worked during the time period identified in the documents;

(2) The names and locations of any mills in which the claimant worked;

(3) The actual time period the claimant worked in each mill; and

(4) The claimant's occupation in each mill.

(e) The Program may, for the purpose of verifying information submitted pursuant to this section, require the claimant or any eligible surviving beneficiary to provide an authorization

to release any record identified in this section, in accordance with the provisions of § 79.72(c).

(f) In determining whether a claimant satisfies the employment criteria of the Act, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. If the Assistant Director concludes that the claimant has not satisfied the employment requirements of the Act, the claimant or eligible surviving beneficiary will be notified and afforded the opportunity, in accordance with the provisions of § 79.72(c), to submit additional records to establish that the statutory employment criteria are satisfied.

#### **§ 79.54 Proof of primary lung cancer.**

(a) In determining whether a claimant developed primary lung cancer following pertinent employment as a miller, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed primary lung cancer must be supported by medical documentation. To prove that a claimant developed primary lung cancer, the claimant or beneficiary may submit any form of medical documentation specified in paragraph (e) of this section. In all cases, the Program will review submitted medical documentation, and will, in addition and where appropriate, review any pertinent records discovered within the sources identified in paragraphs (b), (c) and (d) of this section.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. (In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary lung cancer.)

(c) If a claimant was diagnosed as having primary lung cancer in Arizona, Colorado, Nevada, New Mexico, Utah, or Wyoming, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information, valid in the state of diagnosis, that authorizes the Radiation Exposure Compensation Program to contact the appropriate state cancer or tumor registry, the Program will, where appropriate, request the relevant information from that registry and will

review records that it obtains from the registry. (In cases where the claimant is deceased, the Program will accept as proof of medical condition verification from the state cancer or tumor registry that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary lung cancer.)

(d) If medical records regarding the claimant were gathered during the course of any federally supported, health-related study of uranium workers, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. (In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of primary lung cancer.)

(e) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted primary lung cancer. Such documentation will be most useful where it contains an explicit statement of diagnosis or such other information or data from which the appropriate authorities at the National Cancer Institute can make a diagnosis to a reasonable degree of medical certainty:

(1) Pathology report of tissue biopsy, including, but not limited to, specimens obtained by any of the following methods:

(i) Surgical resection;

(ii) Endoscopic endobronchial or transbronchial biopsy;

(iii) Bronchial brushings and washings;

(iv) Pleural fluid cytology;

(v) Fine needle aspirate;

(vi) Pleural biopsy; or

(vii) Sputum cytology;

(2) Autopsy report;

(3) Bronchoscopy report;

(4) One of the following summary medical reports:

(i) Physician summary report;

(ii) Hospital discharge summary

report;

(iii) Operative report;

(iv) Radiation therapy summary

report; or

(v) Oncology summary or consultation

report;

(5) Reports of radiographic studies, including:

- (i) X-rays of the chest;
- (ii) Chest tomograms;
- (iii) Computer-assisted tomography (CT); or
- (iv) Magnetic resonance imaging (MRI); or

(6) Death certificate, provided that it is signed by a physician at the time of death.

**§ 79.55 Proof of nonmalignant respiratory disease.**

(a) In determining whether a claimant developed a nonmalignant respiratory disease following pertinent employment as a miller, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed a nonmalignant respiratory disease must be supported by medical documentation. In cases where the claimant is deceased, the claimant's beneficiary may submit any form of medical documentation specified in paragraph (d)(1) of this section, and for proof of cor pulmonale must also submit one or more forms of documentation specified in paragraph (d)(2). A living claimant must at a minimum submit the medical documentation required in paragraph (d)(3) of this section, and for proof of cor pulmonale must also submit one or more forms of documentation specified in paragraph (d)(2). In all cases, the Program will review submitted medical documentation, and will, in addition and where appropriate, review any pertinent records discovered within the sources referred to in paragraphs (b) and (c) of this section. With respect to a deceased claimant, the Program will treat as equivalent to a diagnosis of pulmonary fibrosis any diagnosis of "restrictive lung disease" made by a physician employed by the Indian Health Service.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. (In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of a nonmalignant respiratory disease.)

(c) If medical records regarding the claimant were gathered during the course of any federally supported,

health-related study of uranium workers, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. (In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of a nonmalignant respiratory disease.)

(d) (1) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted a nonmalignant respiratory disease, including pulmonary fibrosis, fibrosis of the lung, cor pulmonale related to fibrosis of the lung, silicosis, and pneumoconiosis:

- (i) Pathology report of tissue biopsy;
- (ii) Autopsy report;
- (iii) If an x-ray exists, the x-ray and interpretive reports of the x-ray by a maximum of two NIOSH certified "B" readers classifying the existence of disease of category 1/0 or higher according to a 1989 report of the International Labor Office (known as the "ILO"), or subsequent revisions;
- (iv) If no x-rays exist, an x-ray report;
- (v) Physician summary report;
- (vi) Hospital discharge summary report;
- (vii) Hospital admitting report;
- (viii) Death certificate, provided that it is signed by a physician at the time of death; or
- (ix) Documentation specified in paragraphs (d)(3)(i) and (d)(3)(ii) of this section.

(2) In order to demonstrate that the claimant developed cor pulmonale related to fibrosis of the lung, the claimant or beneficiary must, at a minimum, submit one or more of the following medical records:

- (i) Right heart catheterization;
- (ii) Cardiology summary or consultation report;
- (iii) Electrocardiogram;
- (iv) Echocardiogram;
- (v) Physician summary report;
- (vi) Hospital discharge summary report;
- (vii) Autopsy report;
- (viii) Report of physical examination; or

(ix) Death certificate, provided that it is signed by a physician at the time of death.

(3) Notwithstanding any other documentation provided, a living claimant must at a minimum provide the following medical documentation:

(i) Either:  
(A) An arterial blood gas study administered at rest in a sitting position, or an exercise arterial blood gas test, reflecting values equal to or less than the values set forth in the tables to appendix B of this part; or

(B) A written diagnosis by a physician in accordance with § 79.51(s); and

(ii) One of the following:  
(A) A chest x-ray administered in accordance with standard techniques accompanied by interpretive reports of the x-ray by a maximum of two NIOSH certified "B" readers, classifying the existence of disease of category 1/0 or higher according to a 1989 report of the International Labor Office (known as the "ILO") or subsequent revisions;

(B) High-resolution computed tomography scans (commonly known as "HRCT scans"), including computer-assisted tomography scans (commonly known as "CAT scans"), magnetic resonance imaging scans (commonly known as "MRI scans"), and positron emission tomography scans (commonly known as "PET scans"), and interpretive reports of such scans;

(C) Pathology reports of tissue biopsies; or

(D) Pulmonary function tests indicating restrictive lung function and consisting of three reproducible time/volume tracings recording the results of the forced expiratory volume in one second (FEV1) and the forced vital capacity (FVC) administered and reported in accordance with the Standardization of Spirometry—1994 Update by the American Thoracic Society, and reflecting values for FEV1 or FVC that are less than or equal to the lower limit of normal for an individual of the claimant's age, sex, height, and ethnicity as set forth in the tables in appendix A to this part.

(e) The Assistant Director shall treat any documentation described in paragraph (d)(3)(i)(B) or paragraph (d)(3)(ii)(A) of this section as conclusive evidence of the claimant's nonmalignant respiratory disease; provided, however, that the Program may subject such documentation to a fair and random audit to guarantee its authenticity and reliability for purposes of treating it as conclusive evidence; and provided further that, in order to be treated as conclusive evidence, a written diagnosis described in paragraph (d)(3)(i)(B) must be by a physician who is employed by the Indian Health Service or the Department of Veterans Affairs or who is board certified (as described in

§ 79.51(s)), and who must have a documented, ongoing physician-patient relationship with the claimant. Notwithstanding the conclusive effect given to certain evidence, nothing in this paragraph shall be construed as relieving a living claimant of the obligation to provide the Program with the forms of documentation required under paragraph (d)(3).

#### § 79.56 Proof of primary renal cancer.

(a) In determining whether a claimant developed primary renal cancer following pertinent employment as a miller, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed primary renal cancer must be supported by medical documentation. In all cases, the Program will review submitted medical documentation, and will, in addition and where appropriate, review any pertinent records discovered within the sources referred to in paragraphs (b) and (c) of this section.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. (In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary renal cancer.)

(c) If a claimant was diagnosed as having primary renal cancer in the State of Arizona, Colorado, Nevada, New Mexico, Utah, or Wyoming, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information, valid in the state of diagnosis, that authorizes the Radiation Exposure Compensation Program to contact the appropriate state cancer or tumor registry, the Program will, where appropriate, request the relevant information from that registry and will review records that it obtains from the registry. (In cases where the claimant is deceased, the Program will accept as proof of medical condition verification from the state cancer or tumor registry that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary renal cancer.)

(d) If medical records regarding the claimant were gathered during the course of any federally supported,

health-related study of uranium workers, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. (In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of primary renal cancer.)

(e) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted primary renal cancer. Such documentation will be most useful where it contains an explicit statement of diagnosis or such other information or data from which the appropriate authorities at the National Cancer Institute can make a diagnosis to a reasonable degree of medical certainty:

- (1) Pathology report of tissue biopsy or resection;
- (2) Autopsy report;
- (3) One of the following summary medical reports:
  - (i) Physician summary report;
  - (ii) Hospital discharge summary report;
  - (iii) Operative report;
  - (iv) Radiotherapy summary report; or
  - (v) Medical oncology summary or consultation report;
- (4) Report of one of the following radiology examinations:
  - (i) Computerized tomography (CT) scan; or
  - (ii) Magnetic resonance imaging (MRI); or
- (5) Death certificate, provided that it is signed by a physician at the time of death.

#### § 79.57 Proof of chronic renal disease.

(a) In determining whether a claimant developed chronic renal disease following pertinent employment as a miller, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed chronic renal disease must be supported by medical documentation.

(b) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted chronic renal disease.

- (1) Pathology report of tissue biopsy;
- (2) If laboratory or radiographic tests exist:

- (i) Abnormal plasma creatinine values; and
- (ii) Abnormal glomerular filtration rate (by either measured creatinine or iothalamate clearance or calculated by MDRD equation); and
- (iii) Renal tubular dysfunction as evidenced by:
  - (A) Glycosuria in the absence of diabetes mellitus;
  - (B) Proteinuria less than one gram daily without other known etiology; or
  - (C) Hyperphosphaturia, aminoaciduria, B-2 microglobulinuria or alkaline phosphaturia or other marker of proximal tubular injury; or
- (iv) Radiographic evidence of chronic renal disease;
- (3) Autopsy report;
- (4) Physician summary report;
- (5) Hospital discharge summary report;
- (6) Hospital admitting report; or
- (7) Death certificate, provided that it is signed by a physician at the time of death.

#### Subpart G—Eligibility Criteria for Claims by Ore Transporters

##### § 79.60 Scope of subpart.

The regulations in this subpart define the eligibility criteria for compensation under section 5 of the Act pertaining to uranium or vanadium-uranium ore transporters and the nature of evidence that will be accepted as proof that a claimant satisfies such eligibility criteria. Section 5 of the Act provides for a payment of \$100,000 to persons who contracted lung cancer, one of a limited number of nonmalignant respiratory diseases, renal cancer, or chronic renal disease, following employment for at least one year as a transporter of uranium ore or vanadium-uranium ore from a uranium mine or uranium mill located in a specified state during the period beginning January 1, 1942, and ending December 31, 1971.

##### § 79.61 Definitions.

(a) *Chronic renal disease* means the chronic, progressive, and irreversible destruction of the nephron. It is exhibited by diminution of renal function.

(b) *Cor pulmonale* means heart disease, including hypertrophy of the right ventricle, due to pulmonary hypertension secondary to fibrosis of the lung.

(c) *Designated time period* means the period beginning on January 1, 1942, and ending on December 31, 1971.

(d) *Employment as an ore transporter* means employment involving the

transporting or hauling of uranium ore or vanadium-uranium ore from a uranium mine or uranium mill, including the transportation or hauling of ore from an ore buying station, "upgrader," "concentrator" facility, or pilot plant by means of truck, rail or barge.

(e) *Employment for at least one year* means employment for a total of at least one year (12 consecutive or cumulative months).

(f) *Fibrosis of the lung or pulmonary fibrosis* means chronic inflammation and scarring of the pulmonary interstitium and alveoli with collagen deposition and progressive thickening.

(g) *Kidney tubal (tubular) tissue injury* means structural or functional damage to the kidney tubules that results in renal disease and dysfunction.

(h) *National Institute for Occupational Safety and Health (NIOSH) certified "B" reader* means a physician who is certified as such by NIOSH. A list of certified "B" readers is available from the Radiation Exposure Compensation Program upon request.

(i) *Nephritis* means an inflammatory process of the kidneys resulting in chronic renal dysfunction.

(j) *Nonmalignant respiratory disease* means fibrosis of the lung, pulmonary fibrosis, cor pulmonale related to fibrosis of the lung, silicosis, and pneumoconiosis.

(k) *Pneumoconiosis* means a chronic lung disease resulting from inhalation and deposition in the lung of particulate matter, and the tissue reaction to the presence of the particulate matter. For the purposes of this Act, the claimant's exposure to the particulate matter that led to the disease must have occurred during employment as an ore transporter.

(l) *Primary lung cancer* means any physiological condition of the lung, trachea, or bronchus that is recognized under that name or nomenclature by the National Cancer Institute. The term includes in situ lung cancers.

(m) *Readily available documentation* means documents in the possession, custody, or control of the claimant or an immediate family member.

(n) *Primary renal cancer* means any physiological condition of the kidneys that is recognized under that name or nomenclature by the National Cancer Institute.

(o) *Silicosis* means a pneumoconiosis due to the inhalation of the dust of stone, sand, flint or other materials containing silicon dioxide, characterized by the formation of pulmonary fibrotic changes.

(p) *Specified state* means Colorado, New Mexico, Arizona, Wyoming, South

Dakota, Washington, Utah, Idaho, North Dakota, Oregon, or Texas. Additional states may be included, provided:

(1) A uranium mine was operated in such state at any time during the period beginning on January 1, 1942, and ending on December 31, 1971;

(2) The state submits an application to the Assistant Director (specified in § 79.70(a)) to include such state; and

(3) The Assistant Director makes a determination to include such state.

(q) *Uranium mill* means any milling operation involving the processing of uranium ore or vanadium-uranium ore, including carbonate plants and acid leach plants. The term applies to ore-buying stations where ore was weighed and sampled prior to delivery to a mill for processing; "upgrader" or "concentrator" facilities located at the mill or at a remote location where uranium or vanadium-uranium ore was processed prior to delivery to a mill; and pilot plants where uranium ore or vanadium-uranium ore was processed.

(r) *Uranium mine* means any underground excavation, including "dog holes," as well as open-pit, strip, rim, surface, or other aboveground mines, where uranium ore or vanadium-uranium ore was mined or otherwise extracted.

(s) *Written diagnosis by a physician* means a written determination of the nature of a disease made from a study of the signs and symptoms of a disease that is based on a physical examination of the patient, medical imaging or a chemical, microscopic, microbiologic, immunologic, or pathologic study of physiologic and functional tests, secretions, discharges, blood, or tissue. For purposes of satisfying the requirement of a "written diagnosis by a physician" for living claimants specified in § 79.65, a physician submitting a written diagnosis of a nonmalignant respiratory disease must be employed by the Indian Health Service or the Department of Veterans Affairs or be board certified, and must have a documented, ongoing physician-patient relationship with the claimant. An "ongoing physician-patient relationship" can include referrals made to specialists from a primary care provider for purposes of diagnosis or treatment. "Board certification" requires, in addition to physician licensing, the successful completion of a residency training program and passage of a Board exam in a relevant field or specialty. Relevant specialties include: family practice, internal medicine, pathology, preventive medicine, radiology, surgery, and thoracic surgery (and including subspecialties such as cardiovascular

disease, medical oncology, pulmonary disease) as listed by the American Board of Medical Specialties.

#### **§ 79.62 Criteria for eligibility for claims by ore transporters.**

To establish eligibility for compensation under this subpart, a claimant or eligible surviving beneficiary of a claimant must establish each of the following:

(a) The claimant was employed as an ore transporter in a specified state;

(b) The claimant was so employed for at least one year (12 consecutive or cumulative months) during the period beginning on January 1, 1942, and ending on December 31, 1971; and

(c) The claimant contracted primary lung cancer, a nonmalignant respiratory disease, primary renal cancer, or chronic renal disease (including nephritis and kidney tubal tissue injury) following at least one year of such employment.

#### **§ 79.63 Proof of employment as an ore transporter.**

(a) The Department will accept, as proof of employment for the time period indicated, information contained in any of the following records:

(1) Records created by or gathered by the Public Health Service (PHS) in the course of any health studies of uranium workers during or including the period 1942–1990;

(2) Records of a uranium worker census performed by the PHS at various times during the period 1942–1990;

(3) Records of the Atomic Energy Commission (AEC), or any of its successor agencies; and

(4) Records of federally supported, health-related studies of uranium workers.

(b) The employment history for the time period indicated in such records will be presumed to be correct. If the claimant or eligible surviving beneficiary wishes to contest the accuracy of such records, then the claimant or eligible surviving beneficiary may provide one or more of the records identified in paragraph (c) of this section, and the Assistant Director will determine whether the employment history indicated in the records listed in paragraph (a) of this section is correct.

(c) If the sources in paragraph (a) of this section do not contain information regarding the claimant's ore transporting employment history, do not contain sufficient information to establish employment for at least one year as an ore transporter during the specified time period to qualify under § 79.62(b), or if a claimant or eligible surviving beneficiary wishes to contest the

accuracy of such records, then the claimant or eligible surviving beneficiary may submit records from any of the following sources, which the Assistant Director shall consider (in addition to any sources listed in paragraph (a) of this section) in order to determine whether the claimant has established the requisite employment history:

(1) Records of any of the specified states, including records of state regulatory agencies, containing information on uranium ore transporters and ore-transporting companies;

(2) Records of any business entity that owned or operated an ore-transporting company, or its successor-in-interest;

(3) Records of the Social Security Administration reflecting the identity of the employer, the years and quarters of employment, and the wages received during each quarter;

(4) Federal or state income tax records that contain relevant statements regarding the claimant's employer and wages;

(5) Records containing factual findings by any governmental judicial body, state worker's compensation board, or any governmental administrative body adjudicating the claimant's rights to any type of benefits (which will be accepted only to prove the fact of and duration of employment as an ore transporter);

(6) Statements in medical records created during the period 1942–1971 indicating or identifying the claimant's employer and occupation;

(7) Records of an academic or scholarly study, not conducted in anticipation of or in connection with any litigation, and completed prior to 1990; or

(8) Any other contemporaneous record that indicates or identifies the claimant's occupation or employer.

(d) To the extent that the documents submitted from the sources identified in this section do not so indicate, the claimant or eligible surviving beneficiary must set forth under oath on the standard claim form the following information, if known:

(1) The name or other identifying symbol of each employer for which the claimant worked during the time period identified in the documents;

(2) The name of each mine or mill from which uranium or uranium-vanadium ore was transported;

(3) The county and state in which each mine or mill was located;

(4) The actual time period the claimant worked as an ore transporter; and

(5) The method of transportation used to transport the ore.

(e) The Program may, for the purpose of verifying information submitted pursuant to this section, require the claimant or any eligible surviving beneficiary to provide an authorization to release any record identified in this section, in accordance with the provisions of § 79.72(c).

(f) In determining whether a claimant satisfies the employment criteria of the Act, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. If the Assistant Director concludes that the claimant has not satisfied the employment requirements of the Act, the claimant or eligible surviving beneficiary will be notified and afforded the opportunity, in accordance with the provisions of § 79.72(c), to submit additional records to establish that the statutory employment criteria are satisfied.

#### **§ 79.64 Proof of primary lung cancer.**

(a) In determining whether a claimant developed primary lung cancer following pertinent employment as an ore transporter, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed primary lung cancer must be supported by medical documentation. To prove that a claimant developed primary lung cancer, the claimant or beneficiary may submit any form of medical documentation specified in paragraph (e) of this section. In all cases, the Program will review submitted medical documentation, and will, in addition and where appropriate, review any pertinent records discovered within the sources identified in paragraphs (b), (c), and (d) of this section.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. (In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary lung cancer.)

(c) If a claimant was diagnosed as having primary lung cancer in Arizona, Colorado, Nevada, New Mexico, Utah or Wyoming, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information, valid in the state of diagnosis, that authorizes the Radiation Exposure Compensation

Program to contact the appropriate state cancer or tumor registry, the Program will, where appropriate, request the relevant information from that registry and will review records that it obtains from the registry. (In cases where the claimant is deceased, the Program will accept as proof of medical condition verification from the state cancer or tumor registry that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary lung cancer.)

(d) If medical records regarding the claimant were gathered during the course of any federally supported, health-related study of uranium workers, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. (In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of primary lung cancer.)

(e) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted lung cancer. Such documentation will be most useful where it contains an explicit statement of diagnosis or such other information or data from which the appropriate authorities at the National Cancer Institute can make a diagnosis to a reasonable degree of medical certainty:

(1) Pathology report of tissue biopsy, including, but not limited to, specimens obtained by any of the following methods:

(i) Surgical resection;

(ii) Endoscopic endobronchial or transbronchial biopsy;

(iii) Bronchial brushings and washings;

(iv) Pleural fluid cytology;

(v) Fine needle aspirate;

(vi) Pleural biopsy; or

(vii) Sputum cytology;

(2) Autopsy report;

(3) Bronchoscopy report;

(4) One of the following summary medical reports:

(i) Physician summary report;

(ii) Hospital discharge summary report;

(iii) Operative report;

- (iv) Radiation therapy summary report; or
- (v) Oncology summary or consultation report;
- (5) Reports of radiographic studies, including:
  - (i) X-rays of the chest;
  - (ii) Chest tomograms;
  - (iii) Computer-assisted tomography (CT); or
  - (iv) Magnetic resonance imaging (MRI); or
- (6) Death certificate, provided that it is signed by a physician at the time of death.

**§ 79.65 Proof of nonmalignant respiratory disease.**

(a) In determining whether a claimant developed a nonmalignant respiratory disease following pertinent employment as an ore transporter, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed a nonmalignant respiratory disease must be supported by medical documentation. In cases where the claimant is deceased, the claimant's beneficiary may submit any form of medical documentation specified in paragraph (d)(1) of this section, and for proof of cor pulmonale must also submit one or more forms of documentation specified in paragraph (d)(2). A living claimant must at a minimum submit the medical documentation required in paragraph (d)(3) of this section, and for proof of cor pulmonale must also submit one or more forms of documentation specified in paragraph (d)(2). In all cases, the Program will review submitted medical documentation, and will, in addition and where appropriate, review any pertinent records discovered within the sources referred to in paragraphs (b) and (c) of this section. With respect to a deceased claimant, the Program will treat as equivalent to a diagnosis of pulmonary fibrosis any diagnosis of "restrictive lung disease" made by a physician employed by the Indian Health Service.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. (In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified

diagnosis of a nonmalignant respiratory disease.)

(c) If medical records regarding the claimant were gathered during the course of any federally supported, health-related study of uranium workers, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. (In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of a nonmalignant respiratory disease.)

(d)(1) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted a nonmalignant respiratory disease, including pulmonary fibrosis, fibrosis of the lung, cor pulmonale related to fibrosis of the lung, silicosis and pneumoconiosis:

- (i) Pathology report of tissue biopsy;
- (ii) Autopsy report;
- (iii) If an x-ray exists, the x-ray and interpretive reports of the x-ray by a maximum of two NIOSH certified "B" readers classifying the existence of disease of category 1/0 or higher according to a 1989 report of the International Labor Office (known as the "ILO"), or subsequent revisions;
- (iv) If no x-rays exist, an x-ray report;
- (v) Physician summary report;
- (vi) Hospital discharge summary report;
- (vii) Hospital admitting report;
- (viii) Death certificate, provided that it is signed by a physician at the time of death; or
- (ix) Documentation specified in paragraphs (d)(3)(i) and (d)(3)(ii) of this section.

(2) In order to demonstrate that the claimant developed cor pulmonale related to fibrosis of the lung, the claimant or beneficiary must, at a minimum, submit one or more of the following medical records:

- (i) Right heart catheterization;
- (ii) Cardiology summary or consultation report;
- (iii) Electrocardiogram;
- (iv) Echocardiogram;
- (v) Physician summary report;
- (vi) Hospital discharge summary report;

- (vii) Autopsy report;
- (viii) Report of physical examination; or
- (ix) Death certificate, provided that it is signed by a physician at the time of death.

(3) Notwithstanding any other documentation provided, a living claimant must at a minimum provide the following medical documentation:

- (i) Either:
  - (A) An arterial blood gas study administered at rest in a sitting position, or an exercise arterial blood gas test, reflecting values equal to or less than the values set forth in the tables in appendix B to this part; or
  - (B) A written diagnosis by a physician in accordance with § 79.61(s); and
- (ii) One of the following:

(A) A chest x-ray administered in accordance with standard techniques accompanied by interpretive reports of the x-ray by a maximum of two NIOSH certified "B" readers, classifying the existence of disease of category 1/0 or higher according to a 1989 report of the International Labor Office (known as the "ILO"), or subsequent revisions;

(B) High-resolution computed tomography scans (commonly known as "HRCT scans"), including computer-assisted tomography scans (commonly known as "CAT scans"), magnetic resonance imaging scans (commonly known as "MRI scans"), and positron emission tomography scans (commonly known as "PET scans"), and interpretive reports of such scans;

(C) Pathology reports of tissue biopsies; or

(D) Pulmonary function tests indicating restrictive lung function and consisting of three reproducible time/volume tracings recording the results of the forced expiratory volume in one second (FEV1) and the forced vital capacity (FVC) administered and reported in accordance with the Standardization of Spirometry—1994 Update by the American Thoracic Society, and reflecting values for FEV1 or FVC that are less than or equal to the lower limit of normal for an individual of the claimant's age, sex, height, and ethnicity as set forth in the tables in appendix A to this part.

(e) The Assistant Director shall treat any documentation described in paragraph (d)(3)(i)(B) or paragraph (d)(3)(ii)(A) of this section as conclusive evidence of the claimant's nonmalignant respiratory disease; provided, however, that the Program may subject such documentation to a fair and random audit to guarantee its authenticity and reliability for purposes of treating it as conclusive evidence; and provided further that, in order to be treated as



conclusive evidence, a written diagnosis described in paragraph (d)(3)(i)(B) must be by a physician who is employed by the Indian Health Service or the Department of Veterans Affairs or who is board certified (as described in § 79.61(s)), and who must have a documented, ongoing physician-patient relationship with the claimant. Notwithstanding the conclusive effect given to certain evidence, nothing in this paragraph shall be construed as relieving a living claimant of the obligation to provide the Program with the forms of documentation required under paragraph (d)(3).

#### **§ 79.66 Proof of primary renal cancer.**

(a) In determining whether a claimant developed primary renal cancer following pertinent employment as an ore transporter, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed primary renal cancer must be supported by medical documentation. In all cases, the Program will review submitted medical documentation, and, in addition and where appropriate, will review any pertinent records discovered within the sources referred to in paragraphs (b) and (c) of this section.

(b) Where appropriate, the Radiation Exposure Compensation Program will search the records of the PHS (including NIOSH), created or gathered during the course of any health study of uranium workers conducted or being conducted by these agencies, to determine whether those records contain proof of the claimant's medical condition. (In cases where the claimant is deceased, the Program will accept as proof of medical condition the verification of the PHS or NIOSH that it possesses medical records or abstracts of medical records of the claimant that contain a verified diagnosis of primary renal cancer.)

(c) If a claimant was diagnosed as having primary renal cancer in Arizona, Colorado, Nevada, New Mexico, Utah or Wyoming, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information, valid in the state of diagnosis, that authorizes the Radiation Exposure Compensation Program to contact the appropriate state cancer or tumor registry, the Program will, where appropriate, request the relevant information from that registry and will review records that it obtains from the registry. (In cases where the claimant is deceased, the Program will accept as proof of medical condition verification from the state cancer or tumor registry that it possesses medical records or abstracts of medical records

of the claimant that contain a verified diagnosis of primary renal cancer.)

(d) If medical records regarding the claimant were gathered during the course of any federally supported, health-related study of uranium workers, and the claimant or eligible surviving beneficiary submits with the claim an Authorization To Release Medical or Other Information that authorizes the Program to contact the custodian of the records of the study to determine if proof of the claimant's medical condition is contained in the records of the study, the Program will, where appropriate, request such records from that custodian and will review records that it obtains from the custodian. (In cases where the claimant is deceased, the Program will accept as proof of the claimant's medical condition such medical records or abstracts of medical records containing a verified diagnosis of primary renal cancer.)

(e) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted primary renal cancer. Such documentation will be most useful where it contains an explicit statement of diagnosis or such other information or data from which the appropriate authorities at the National Cancer Institute can make a diagnosis to a reasonable degree of medical certainty:

- (1) Pathology report of tissue biopsy or resection;
- (2) Autopsy report;
- (3) One of the following summary medical reports:
  - (i) Physician summary report;
  - (ii) Hospital discharge summary report;
  - (iii) Operative report;
  - (iv) Radiotherapy summary report; or
  - (v) Medical oncology summary or consultation report;
- (4) Report of one of the following radiology examinations:
  - (i) Computerized tomography (CT) scan;
  - (ii) Magnetic resonance imaging (MRI); or
- (5) Death certificate, provided that it is signed by a physician at the time of death.

#### **§ 79.67 Proof of chronic renal disease.**

(a) In determining whether a claimant developed chronic renal disease following pertinent employment as an ore transporter, the Assistant Director shall resolve all reasonable doubt in favor of the claimant. A conclusion that a claimant developed chronic renal disease must be supported by medical documentation.

(b) A claimant or beneficiary may submit any of the following forms of medical documentation in support of a claim that the claimant contracted chronic renal disease.

- (1) Pathology report of tissue biopsy;
- (2) If laboratory or radiographic tests exist:
  - (i) Abnormal plasma creatinine values;
  - (ii) Abnormal glomerular filtration rate (by either measured creatinine or iothalamate clearance or calculated by MDRD equation); and
  - (iii) Renal tubular dysfunction as evidenced by:
    - (A) Glycosuria in the absence of diabetes mellitus;
    - (B) Proteinuria less than one gram daily without other known etiology; or
    - (C) Hyperphosphaturia, aminoaciduria, B-2 microglobulinuria or alkaline phosphaturia or other marker of proximal tubular injury; or
  - (iv) Radiographic evidence of chronic renal disease;
- (3) Autopsy report;
- (4) Physician summary report;
- (5) Hospital discharge summary report;
- (6) Hospital admitting report; or
- (7) Death certificate, provided that it is signed by a physician at the time of death.

### **Subpart H—Procedures**

#### **§ 79.70 Attorney General's delegation of authority.**

(a) An Assistant Director within the Constitutional and Specialized Torts Staff, Torts Branch, Civil Division, shall be assigned to manage the Radiation Exposure Compensation Program and issue a decision on each claim filed under the Act, and otherwise act on behalf of the Attorney General in all other matters relating to the administration of the Program, except for rulemaking authority. The Assistant Director may delegate any of his or her responsibilities under the regulations in this part to an attorney working under the supervision of the Assistant Director.

(b) The Assistant Attorney General, Civil Division, shall designate an Appeals Officer to act on appeals from the Assistant Director's decisions.

#### **§ 79.71 Filing of claims.**

(a) All claims for compensation under the Act must be in writing and submitted on a standard claim form designated by the Assistant Director for the filing of compensation claims. Except as specifically provided in this part, the claimant or eligible surviving beneficiary must furnish the medical

documentation required by this part with his or her standard form. Except as specifically provided in this part, the claimant or eligible surviving beneficiary must also provide with the standard form any records establishing the claimant's physical presence in an affected area, onsite participation, employment in a uranium mine or mill, or employment as an ore transporter, in accordance with this part. The standard claim form must be completed, signed under oath either by a person eligible to file a claim under the Act or by that person's legal guardian, and mailed with supporting documentation to the following address: Radiation Exposure Compensation Program, U.S. Department of Justice, P.O. Box 146, Ben Franklin Station, Washington, DC 20044-0146. Copies of the standard form, as well as the regulations, guidelines, and other information, may be obtained by requesting the document or publications from the Assistant Director at that address or by accessing the Program's Web site at <http://www.usdoj.gov/civil/reca>.

(b) The Assistant Director will file a claim after receipt of the standard form with supporting documentation and examination for substantial compliance with this part. The date of filing shall be recorded by a stamp on the face of the standard form. The Assistant Director shall file only claims that substantially comply with paragraph (a) of this section. If a claim substantially fails to comply with paragraph (a), the Assistant Director shall promptly return the claim unfiled to the sender with a statement identifying the reason(s) why the claim does not comply with this part. The sender may return the claim to the Assistant Director after correcting the deficiencies. For those cases that are filed, the Assistant Director shall promptly acknowledge receipt of the claim with a letter identifying the number assigned to the claim, the date the claim was filed, and the period within which the Assistant Director must act on the claim.

(c) The following persons or their legal guardians are eligible to file claims for compensation under the Act in the following order:

- (1) The claimant;
- (2) If the claimant is deceased, the spouse of the claimant, provided that he or she was married to the claimant for at least one year immediately prior to the claimant's death;
- (3) If there is no surviving spouse or if the spouse is ineligible because he or she was not married to the claimant for at least one year immediately prior to the claimant's death, a child of the claimant;

(4) If there is no eligible surviving spouse and no child, a parent of the claimant;

(5) If there is no eligible surviving spouse and no child or parent, a grandchild of the claimant; or

(6) If there is no eligible surviving spouse and no child, parent or grandchild, a grandparent of the claimant.

(7) Only the beneficiaries listed in this paragraph (c) are eligible to file a claim on behalf of the claimant.

(d) The identity of the claimant must be established by submitting a birth certificate or one of the other documents identified in § 79.14(a) when the person has no birth certificate. Additionally, documentation demonstrating any and all name changes must be provided.

(e)(1) The spouse of a claimant must establish his or her eligibility to file a claim by furnishing:

(i) His or her birth certificate and, if applicable, documentation demonstrating any and all name changes;

(ii) The birth and death certificates of the claimant;

(iii) One of the following documents to establish a marriage to the claimant:

(A) The public record of marriage;

(B) A certificate of marriage;

(C) The religious record of marriage; or

(D) A judicial or other governmental determination that a valid marriage existed, such as the final opinion or order of a probate court or a determination of the Social Security Administration that the person filing the claim is the spouse of the decedent;

(iv) A death certificate or divorce decree for each spouse of the claimant (if applicable); and

(v) An affidavit (or declaration under oath on the standard claim form) stating that the spouse was married to the claimant for at least one year immediately prior to the claimant's death.

(2) If the spouse is a member of an Indian Tribe, he or she need not provide any of the documents listed in paragraph (e)(1) of this section at the time the claim is filed (although these records may later be required), but should instead furnish a signed release of private information that the Assistant Director will use to obtain a statement of verification of all of the information listed in paragraph (e)(1) directly from the tribal records custodian. In identifying those individuals eligible to receive compensation by virtue of marriage, relationship, or survivorship, the Assistant Director shall, to the maximum extent practicable, take into consideration and give effect to

established law, tradition, and custom of the particular affected Indian Tribe.

(f)(1) A child of a claimant must establish his or her eligibility to file a claim by furnishing:

(i) His or her birth certificate and, if applicable, documentation demonstrating any and all name changes;

(ii) The birth and death certificates of the claimant;

(iii) One of the documents listed in paragraph (e)(1)(iii) of this section to establish each marriage of the claimant (if applicable);

(iv) A death certificate or divorce decree for each spouse of the claimant (if applicable);

(v) A death certificate for each of the other children of the claimant (if applicable);

(vi) An affidavit (or declaration under oath on the standard claim form) stating the following:

(A) That the claimant was never married, or, if the claimant was ever married, the name of each spouse, the date each marriage began and ended, and the date and place of divorce or death of the last spouse of the claimant; and

(B) That the claimant had no other children, or, if the claimant did have other children, the name of each child, the date and place of birth of each child, and the date and place of death or current address of each child; and

(vii) One of the following:

(A) In the case of a natural child, a birth certificate showing that the claimant was the child's parent, or a judicial decree identifying the claimant as the child's parent;

(B) In the case of an adopted child, the judicial decree of adoption; or

(C) In the case of a stepchild, evidence of birth to the spouse of the claimant as outlined in paragraph (f)(1)(vii) of this section, and records reflecting that the stepchild lived with the claimant in a regular parent-child relationship.

(2) If the child is a member of an Indian Tribe, he or she need not provide any of the documents listed in paragraph (f)(1) of this section at the time the claim is filed (although these records may later be required), but should instead furnish a signed release of private information that the Assistant Director will use to obtain a statement of verification of all of the information listed in paragraph (f)(1) directly from the tribal records custodian. In identifying those individuals eligible to receive compensation by virtue of survivorship, the Assistant Director shall, to the maximum extent practicable, take into consideration and give effect to established law, tradition,

and custom of the particular affected Indian Tribe.

(g)(1) A parent of a claimant must establish his or her eligibility to file a claim by furnishing:

(i) His or her birth certificate and, if applicable, documentation demonstrating any and all name changes;

(ii) The birth and death certificates of the claimant;

(iii) One of the documents listed in paragraph (e)(1)(iii) of this section to establish each marriage of the claimant (if applicable);

(iv) A death certificate or divorce decree for each spouse of the claimant (if applicable);

(v) A death certificate for each child of the claimant (if applicable);

(vi) A death certificate for the other parent(s) (if applicable);

(vii) An affidavit (or declaration under oath on the standard claim form) stating the following:

(A) That the claimant was never married, or, if the claimant was ever married, the name of each spouse, the date each marriage began and ended, and the date and place of divorce or death of the last spouse of the claimant;

(B) That the claimant had no children, or, if the claimant did have children, the name of each child, the date and place of birth of each child, and the date and place of death of each child; and

(C) The name and address, or date and place of death, of the other parent(s) of the claimant; and

(viii) One of the following:

(A) In the case of a natural parent, a birth certificate showing that the claimant was the parent's child, or a judicial decree identifying the claimant as the parent's child; or

(B) In the case of an adoptive parent, the judicial decree of adoption.

(2) If the parent is a member of an Indian Tribe, he or she need not provide any of the documents listed in paragraph (g)(1) of this section at the time the claim is filed (although these records may later be required), but should instead furnish a signed release of private information that the Assistant Director will use to obtain a statement of verification of all of the information listed in paragraph (g)(1) directly from the tribal records custodian. In identifying those individuals eligible to receive compensation by virtue of survivorship, the Assistant Director shall, to the maximum extent practicable, take into consideration and give effect to established law, tradition, and custom of the particular affected Indian Tribe.

(h)(1) A grandchild of a claimant must establish his or her eligibility to file a claim by furnishing:

(i) His or her birth certificate and, if applicable, documentation demonstrating any and all name changes;

(ii) The birth and death certificates of the claimant;

(iii) One of the documents listed in paragraph (e)(1)(iii) of this section to establish each marriage of the claimant (if applicable);

(iv) A death certificate or divorce decree for each spouse of the claimant (if applicable);

(v) A death certificate for each child of the claimant;

(vi) A death certificate for each parent of the claimant;

(vii) A death certificate for each of the other grandchildren of the claimant (if applicable);

(viii) An affidavit (or declaration under oath on the standard claim form) stating the following:

(A) That the claimant was never married, or, if the claimant was ever married, the name of each spouse, the date each marriage began and ended, and the date and place of divorce or death of the last spouse of the claimant;

(B) The name of each child, the date and place of birth of each child, and the date and place of death of each child;

(C) The names of each parent of the claimant together with the dates and places of death of each parent; and

(D) That the claimant had no other grandchildren, or, if the claimant did have other grandchildren, the name of each grandchild, the date and place of birth of each grandchild, and the date and place of death or current address of each grandchild; and

(ix) One of the following:

(A) In the case of a natural grandchild, a combination of birth certificates showing that the claimant was the grandchild's grandparent;

(B) In the case of an adopted grandchild, a combination of judicial records and birth certificates showing that the claimant was the grandchild's grandparent; or

(C) In the case of a stepgrandchild, evidence of birth to the spouse of the child of the claimant, as outlined in this paragraph (h)(1), and records reflecting that the stepchild lived with a child of the claimant in a regular parent-child relationship; or evidence of birth to the spouse of the stepchild of the claimant or the stepchild of the claimant, as outlined in this paragraph (h)(1), and records reflecting that the stepchild of the claimant lived with the claimant in a regular parent-child relationship.

(2) If the grandchild is a member of an Indian Tribe, he or she need not provide any of the documents listed in paragraph (h)(1) of this section at the

time the claim is filed (although these records may later be required), but should instead furnish a signed release of private information that the Assistant Director will use to obtain a statement of verification of all of the information listed in paragraph (h)(1) directly from the tribal records custodian. In identifying those individuals eligible to receive compensation by virtue of survivorship, the Assistant Director shall, to the maximum extent practicable, take into consideration and give effect to established law, tradition, and custom of the particular affected Indian Tribe.

(i)(1) A grandparent of the claimant must establish his or her eligibility to file a claim by furnishing:

(i) His or her birth certificate and, if applicable, documentation demonstrating any and all name changes;

(ii) The birth and death certificates of the claimant;

(iii) One of the documents listed in paragraph (e)(1)(iii) of this section to establish each marriage of the claimant (if applicable);

(iv) A death certificate or divorce decree for each spouse of the claimant (if applicable);

(v) A death certificate for each child of the claimant (if applicable);

(vi) A death certificate for each parent of the claimant;

(vii) A death certificate for each grandchild of the claimant (if applicable);

(viii) A death certificate for each of the other grandparents of the claimant (if applicable);

(ix) An affidavit stating the following:

(A) That the claimant was never married, or if the claimant was ever married, the name of each spouse, the date each marriage began and ended, and the date and place of divorce or death of the last spouse of the claimant;

(B) That the claimant had no children, or, if the claimant did have children, the name of each child, the date and place of birth of each child, and the date and place of death of each child;

(C) The names of each parent of the claimant together with the dates and places of death of each parent;

(D) That the claimant had no grandchildren, or, if the claimant did have grandchildren, the name of each grandchild, the date and place of birth of each grandchild, and the date and place of death of each grandchild; and

(E) The names of all other grandparents of the claimant together with the dates and places of birth of each grandparent, and the dates and places of death of each other

grandparent or the current address of each other grandparent; and

(x) One of the following:

(A) In the case of a natural grandparent, a combination of birth certificates showing that the claimant was the grandparent's grandchild;

(B) In the case of an adoptive grandparent, a combination of judicial records and birth certificates showing that the claimant was the grandparent's grandchild.

(2) If the grandparent is a member of an Indian Tribe, he or she need not provide any of the documents listed in paragraph (i)(1) of this section at the time the claim is filed (although these records may later be required), but should instead furnish a signed release of private information that the Assistant Director will use to obtain a statement of verification of all of the information listed in paragraph (i)(1) directly from the tribal records custodian. In identifying those individuals eligible to receive compensation by virtue of survivorship, the Assistant Director shall, to the maximum extent practicable, take into consideration and give effect to established law, tradition, and custom of the particular affected Indian Tribe.

(j) A claim that was filed and denied may be filed again in those cases where the claimant or eligible surviving beneficiary obtains documentation that he or she did not possess when the claim was filed previously and that redresses the deficiency for which the claim was denied, including, where applicable, documentation addressing:

(1) An injury specified in the Act;

(2) Residency in the affected area;

(3) Onsite participation in a nuclear test;

(4) Exposure to 40 WLMs of radiation while employed in a uranium mine or mines during the designated time period;

(5) Employment for one year (12 consecutive or cumulative months) as a miner, miller or ore transporter; or

(6) The identity of the claimant and/or the eligible surviving beneficiary.

(k) A claimant or eligible surviving beneficiary may not refile a claim more than three times. Claims filed prior to July 10, 2000, will not be included in determining the number of claims filed.

#### **§ 79.72 Review and resolution of claims.**

(a) *Initial review.* The Assistant Director shall conduct an initial review of each claim that has been filed to determine whether:

(1) The person submitting the claim represents that he or she is an eligible surviving beneficiary in those cases where the claimant is deceased;

(2) The medical condition identified in the claim is a disease specified in the Act for which the claimant or eligible surviving beneficiary could recover compensation;

(3) For claims submitted under subparts B and C of this part, as relevant, the period and place of physical presence set forth in the claim falls within the designated time period and affected areas identified in § 79.11;

(4) For claims submitted under subparts B and D of this part, as relevant, the place and period of onsite participation set forth in the claim falls within the places and times set forth in § 79.11 and § 79.31; and

(5) For claims submitted under subparts E, F, and G of this part, the period and place of uranium mining, mill working or ore transporting set forth in the claim falls within the designated time period and specified states identified in §§ 79.41, 79.51, and 79.61. If the Assistant Director determines from the initial review that any one of the applicable criteria is not met, or that any other criterion of this part is not met, the Assistant Director shall so advise the claimant or eligible surviving beneficiary in writing, setting forth the reasons for the determination, and allow the claimant or eligible surviving beneficiary 60-days from the date of such notification to correct any deficiency in the claim. If the claimant or eligible surviving beneficiary fails adequately to correct the deficiencies within the 60-day period, the Assistant Director shall, without further review, issue a Decision denying the claim.

(b) *Review of medical documentation.* The Assistant Director will examine the medical documentation submitted in support of the claim and determine whether it satisfies the criteria for eligibility established by the Act and this part. The Assistant Director may, for the purpose of verifying eligibility, require the claimant or eligible surviving beneficiary to provide an authorization to release any medical record identified in this part. If the Assistant Director determines that the documentation does not satisfy the criteria for eligibility established by the Act and this part, the Assistant Director shall so advise the claimant or eligible surviving beneficiary in writing, setting forth the reason(s) for the determination, and shall allow the claimant or eligible beneficiary 60 days from the date of notification, or such greater period as the Assistant Director permits, to furnish additional medical documentation that meets the requirements of the Act and this part. Where appropriate, the Assistant Director may require the claimant or

eligible surviving beneficiary to provide an authorization to release additional records. If the claimant or eligible beneficiary fails, within 60 days or the greater period approved by the Assistant Director, to provide sufficient medical documentation or a valid release when requested by the Assistant Director, then the Assistant Director shall, without further review, issue a Decision denying the claim.

(c) *Review of the records.* The Assistant Director will examine the other records submitted in support of the claim to prove those matters set forth in all other sections of the Act and this part, and will determine whether such records satisfy all other criteria for eligibility. For the purposes of verifying such eligibility, the Assistant Director may require the claimant or eligible surviving beneficiary to provide an authorization to release any record identified in this part. If the Assistant Director determines that the records do not satisfy the criteria for eligibility established by the Act and this part, the Assistant Director shall so advise the claimant or eligible surviving beneficiary in writing, setting forth the reasons for the determination, and shall provide the claimant or eligible surviving beneficiary 60 days from the date of notification, or such greater period as the Assistant Director permits, to furnish additional records to satisfy the requirements of the Act and this part. Where appropriate, the Assistant Director may require the claimant or eligible surviving beneficiary to provide an authorization to release additional records as an alternative to, or in addition to, the claimant or eligible beneficiary furnishing such additional records. If the claimant or eligible beneficiary fails within 60 days or the greater period approved by the Assistant Director, to provide sufficient records or a valid release when requested by the Assistant Director, then the Assistant Director shall, without further review, issue a Decision denying the claim.

(d) *Decision.* The Assistant Director shall review each claim and issue a written Decision on each claim within 12 months of the date the claim was filed. The Assistant Director may request from any claimant, or from any individual or entity on behalf of the claimant, any relevant additional information or documentation necessary to complete the determination of eligibility under paragraphs (a), (b), or (c) of this section. The period beginning on the date on which the Assistant Director makes a request for such additional information or documentation and ending on the date on which the claimant or individual or

entity acting on behalf of the claimant submits that information or documentation (or informs the Assistant Director that it is not possible to provide that information or that the claimant or individual or entity will not provide that information) shall not apply to the 12-month period. Any Decision denying a claim shall set forth reason(s) for the denial, shall indicate that the Decision of the Assistant Director may be appealed to the Assistant Attorney General, Civil Division, in writing within 60 days of the date of the Decision, or such greater period as may be permitted by the Assistant Attorney General, Civil Division, and shall identify the address to which the appeal should be sent.

#### **§ 79.73 Appeals procedures.**

(a) An appeal must be in writing and must be received by the Radiation Exposure Compensation Program within 60 days of the date of the Decision denying the claim, unless a greater period has been permitted. Appeals must be sent to the following address: Radiation Exposure Compensation Program, Appeal of Decision, U.S. Department of Justice, P.O. Box 146, Ben Franklin Station, Washington, DC 20044-0146.

(b) The claimant or eligible surviving beneficiary must set forth in the appeal the reason(s) why he or she believes that the Decision of the Assistant Director is incorrect.

(c) Upon receipt of an appeal, the Radiation Exposure Compensation Program shall forward the appeal, the Decision, the claim, and all supporting documentation to the Appeals Officer for action on the appeal. If the appeal is not received within the 60-day period, or such greater period as may be permitted, the appeal may be denied without further review.

(d) The Appeals Officer shall review any appeal and other information forwarded by the Program. Within 90 days after the receipt of an appeal, the Appeals Officer shall issue a Memorandum either affirming or reversing the Assistant Director's Decision or, when appropriate, remanding the claim to the Assistant Director for further action. The Memorandum shall include a statement of the reason(s) for such reversal, affirmance, or remand. The Memorandum and all papers relating to the claim shall be returned to the Radiation Exposure Compensation Program, which shall promptly inform the claimant or eligible surviving beneficiary of the action of the Appeals Officer. A Memorandum affirming or reversing the Assistant Director's

Decision shall be deemed to be the final action of the Department of Justice on the claim.

(e) Before seeking judicial review of a decision denying a claim under the Act, an individual must first seek review by the designated Appeals Officer. Once the appeals procedures are completed, an individual whose claim for compensation under the Act is affirmed on appeal may seek judicial review in a district court of the United States.

#### **§ 79.74 Representatives and attorney's fees.**

(a) *Representation.* In submitting and presenting a claim to the Program, a claimant or beneficiary may, but need not, be represented by an attorney or by a representative of an Indian Tribe or tribal organization. Non-attorneys (other than representatives of an Indian Tribe or tribal organization) are not permitted to represent claimants or beneficiaries before the Program. To the extent that resources are available, the Assistant Director will provide assistance to all persons who file claims for compensation. Only qualified attorneys, as described in paragraph (c) of this section, may receive from a claimant or beneficiary any fee in connection with a successful claim.

(b) *Fees.* (1) Notwithstanding any contract, the attorney of a claimant or beneficiary, along with any assistants or experts retained by the attorney on behalf of the claimant or beneficiary, may not receive from a claimant or beneficiary any fee for services rendered, including costs incurred, in connection with an unsuccessful claim.

(2) Notwithstanding any contract and except as provided in paragraph (b)(3) of this section, the attorney of a claimant or beneficiary, along with any assistants or experts retained by the attorney on behalf of the claimant or beneficiary, may receive from a claimant or beneficiary no more than 2% of the total award for all services rendered, including costs incurred, in connection with a successful claim.

(3)(i) If an attorney entered into a contract with the claimant or beneficiary for services before July 10, 2000, with respect to a particular claim, then that attorney may receive up to 10% of the total award for services rendered, including costs incurred, in connection with a successful claim.

(ii) If an attorney resubmits a previously denied claim, then that attorney may receive up to 10% of the total award to the claimant or beneficiary for services rendered, including costs incurred, in connection with that subsequently successful claim. Resubmission of a previously denied

claim includes only those claims that were previously denied and refiled under the Act.

(4) Any violation of paragraph (b) of this section shall result in a fine of not more than \$5,000.

(c) *Attorney qualifications.* An attorney may not represent a claimant or beneficiary unless the attorney is engaged in the private practice of law and an active member in good standing of the bar of the highest court of a state. Attorneys who are members of multiple state bars, and who are suspended, sanctioned, disbarred, or disqualified from the practice of law for professional misconduct in one state may not represent a claimant or beneficiary even though the attorney continues to remain in good standing of the bar of another state. If a claimant or beneficiary is represented by an attorney, then the attorney must submit the following documents to the Program along with the claim:

(1) A statement of the attorney's active membership in good standing of the bar of the highest court of a state; and

(2) A signed representation agreement, retainer agreement, fee agreement, or contract, documenting the attorney's authorization to represent the claimant or beneficiary. The document must acknowledge that the Act's fee limitations are satisfied.

#### **§ 79.75 Procedures for payment of claims.**

(a) All awards for compensation are made in the form of one time lump sum payments and shall be made to the claimant or to the legal guardian of the claimant, unless the claimant is deceased at the time of the payment. In cases involving a claimant who is deceased, payment shall be made to each eligible surviving beneficiary or to the legal guardian acting on his or her behalf, in accordance with the terms and conditions specified in the Act. Once the Program has received the claimant's or eligible surviving beneficiary's election to accept the payment, the Assistant Director shall ensure that the claim is paid within six weeks. All time frames for processing claims under the Act are suspended during periods when the Radiation Trust Fund is not funded.

(b) In cases involving the approval of a claim, the Assistant Director shall take all necessary and appropriate steps to determine the correct amount of any offset to be made to the amount awarded under the Act and to verify the identity of the claimant or, in the case of a deceased claimant, the existence of eligible surviving beneficiaries who are entitled by the Act to receive the payment the claimant would have

received. The Assistant Director may conduct any investigation, and may require any claimant or eligible surviving beneficiary to provide or execute any affidavit, record, or document or authorize the release of any information the Assistant Director deems necessary to ensure that the compensation payment is made in the correct amount and to the correct person(s). If the claimant or eligible surviving beneficiary fails or refuses to execute an affidavit or release of information, or to provide a record or document requested, or fails to provide access to information, such failure or refusal may be deemed to be a rejection of the payment, unless the claimant or eligible surviving beneficiary does not have and cannot obtain the legal authority to provide, release or authorize access to the required information, records or documents.

(c) Prior to authorizing payment, the Assistant Director shall require the claimant or each eligible surviving beneficiary to execute and provide an affidavit (or declaration under oath on the standard claim form) setting forth the amount of any payment made pursuant to a final award or settlement on a claim (other than a claim for worker's compensation), against any person, that is based on injuries incurred by the claimant on account of:

(1) Exposure to radiation from an atmospheric detonation of a nuclear device while present in an affected area (as defined in § 79.11(a)) at any time during the periods described in § 79.11(c) or § 79.11(h);

(2) Exposure to radiation while participating onsite in an atmospheric detonation of a nuclear device (as defined in § 79.11(b)) at any time during the periods described in § 79.11(h) (This paragraph (c) only applies to claims filed under section 4(a)(1)(A)(i)(III) of the Act); or

(3) Exposure to radiation during employment in a uranium mine at any time during the period described in section 5 of the Act. For purposes of this paragraph, a "claim" includes, but is not limited to, any request or demand for money made or sought in a civil action or made or sought in anticipation of the filing of a civil action, but shall not include requests or demands made pursuant to a life insurance or health insurance contract. If any such award or settlement payment was made, the Assistant Director shall subtract the sum of such award or settlement payments from the payment to be made under the Act.

(d) In the case of a claim filed under section 4(a)(2)(C) of the Act, the Assistant Director shall require the

claimant or each eligible surviving beneficiary to execute and provide an affidavit (or declaration under oath on the standard claim form) setting forth the amount of any payment made pursuant to a final award or settlement on a claim (other than a claim for worker's compensation) against any person or any payment made by the Department of Veterans Affairs, that is based on injuries incurred by the claimant on account of exposure to radiation as a result of onsite participation in a test involving the atmospheric detonation of a nuclear device. For purposes of this paragraph, a "claim" includes, but is not limited to, any request or demand for money made or sought in a civil action or made or sought in anticipation of a civil action, but shall not include requests or demands made pursuant to a life-or health-insurance contract.

(1) Payments by the Department of Veterans Affairs shall include:

(i) Any disability payments or compensation benefits paid to the claimant and his or her dependents while the claimant is alive; and

(ii) Any Dependency and Indemnity Compensation payments made to survivors due to death related to the illness for which the claim under the Act is submitted.

(2) Payments by the Department of Veterans Affairs shall not include:

(i) Active duty pay, retired pay, retainer pay, or payments under the Survivor Benefits Plan;

(ii) Death gratuities;

(iii) SGLI, VGLI, or mortgage, life, or health insurance payments;

(iv) Burial benefits or reimbursement for burial expenses;

(v) Loans or loan guarantees;

(vi) Education benefits and payments;

(vii) Vocational rehabilitation benefits and payments;

(viii) Medical, hospital, and dental benefits; or

(ix) Commissary and PX privileges.

(e) If any such award, settlement, or payment was made as described in paragraphs (c) or (d) of this section, the Assistant Director shall calculate the actuarial present value of such payment(s), and subtract the actuarial present value from the payment to be made under the Act. The actuarial present value shall be calculated using the worksheet in appendix C to this part in the following manner:

(1) Step 1. The sums of the past payments received in each year are entered in the appropriate rows in column (2). Additional rows will be added as needed to calculate the present value of payments received in the years prior to 1960 and after 1990.

(2) Step 2. The present CPI-U (to be obtained monthly from the Bureau of Labor Statistics, Department of Labor) is entered in column (3).

(3) Step 3. The CPI (Major Expenditure Classes—All Items) for each year in which payments were received is entered in the appropriate row in column (4). (This measure is provided for 1960 through 1990. The measure for subsequent years will be obtained from the Bureau of Labor Statistics.)

(4) Step 4. For each row, the amount in column (2) is multiplied by the corresponding inflator (column (3) divided by column (4)) and the product is entered in column (5).

(5) Step 5. The products in column (5) are added together and the sum is entered on the line labeled "Total of column (5) equals actuarial present value of past payments."

(6) Step 6. The sum in Step 5 is subtracted from the statutory payment of \$75,000 and the remainder is entered on the line labeled "Net Claim Owed To Claimant."

(f) When the Assistant Director has verified the identity of the claimant or each eligible surviving beneficiary who is entitled to the compensation payment or to a share of the compensation payment, and has determined the correct amount of the payment or the share of the payment, he or she shall notify the claimant or each eligible surviving beneficiary, or his or her legal guardian, and require such person(s) to sign an Acceptance of Payment Form. Such form shall be signed and returned within 60 days of the date of the form or such greater period as may be allowed by the Assistant Director. Failure to return the signed form within the required time may be deemed to be a rejection of the payment. Signing and returning the form within the required time shall constitute acceptance of the payment, unless the individual who has signed the form dies prior to receiving the actual payment, in which case the person who possesses the payment shall return it to the Assistant Director for redetermination of the correct disbursement of the payment.

(g) Rejected compensation payments or shares of compensation payments shall not be distributed to other eligible surviving beneficiaries, but shall be returned to the Trust Fund for use in paying other claims.

(h) Upon receipt of the Acceptance of Payment Form, the Assistant Director or the Constitutional and Specialized Torts Staff Director or Deputy Director, or their designee, shall authorize the appropriate authorities to issue a check to the claimant or to each eligible

surviving beneficiary who has accepted payment out of the funds appropriated for this purpose.

(i) *Multiple payments.* (1) No claimant may receive payment under more than one subpart of this part for illnesses that

he or she contracted. In addition to one payment for his or her illnesses, he or she may also receive one payment for each claimant for whom he or she qualifies as an eligible surviving beneficiary.

(2) An eligible surviving beneficiary who is not also a claimant may receive one payment for each claimant for whom he or she qualifies as an eligible surviving beneficiary.

## Appendix A to Part 79—FVC and FEV-1 Lower Limits of Normal Values

TABLE 1.—CAUCASIAN MALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)

[Reference value equation:  $-0.1933 + (0.00064)(\text{age}) + (-0.000269)(\text{age}^2) + (0.00015695)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 2.96         | 2.91 | 2.85 | 2.79 | 2.74 | 2.67 | 2.61 | 2.55 | 2.48 | 2.41 | 2.34 | 2.26 | 2.19 | 2.11 | 2.03 | 1.94 | 1.86 |
| 61.5             | 156.2                 | 3.02         | 2.97 | 2.91 | 2.86 | 2.80 | 2.74 | 2.67 | 2.61 | 2.54 | 2.47 | 2.40 | 2.33 | 2.25 | 2.17 | 2.09 | 2.01 | 1.92 |
| 62.0             | 157.5                 | 3.09         | 3.03 | 2.98 | 2.92 | 2.86 | 2.80 | 2.74 | 2.67 | 2.61 | 2.54 | 2.46 | 2.39 | 2.31 | 2.23 | 2.15 | 2.07 | 1.99 |
| 62.5             | 158.8                 | 3.15         | 3.10 | 3.04 | 2.99 | 2.93 | 2.87 | 2.80 | 2.74 | 2.67 | 2.60 | 2.53 | 2.45 | 2.38 | 2.30 | 2.22 | 2.14 | 2.05 |
| 63.0             | 160.0                 | 3.21         | 3.16 | 3.10 | 3.05 | 2.99 | 2.93 | 2.86 | 2.80 | 2.73 | 2.66 | 2.59 | 2.51 | 2.44 | 2.36 | 2.28 | 2.20 | 2.11 |
| 63.5             | 161.3                 | 3.28         | 3.22 | 3.17 | 3.11 | 3.05 | 2.99 | 2.93 | 2.86 | 2.80 | 2.73 | 2.65 | 2.58 | 2.50 | 2.43 | 2.34 | 2.26 | 2.18 |
| 64.0             | 162.6                 | 3.34         | 3.29 | 3.23 | 3.18 | 3.12 | 3.06 | 2.99 | 2.93 | 2.86 | 2.79 | 2.72 | 2.65 | 2.57 | 2.49 | 2.41 | 2.33 | 2.24 |
| 64.5             | 163.8                 | 3.40         | 3.35 | 3.30 | 3.24 | 3.18 | 3.12 | 3.06 | 2.99 | 2.92 | 2.85 | 2.78 | 2.71 | 2.63 | 2.55 | 2.47 | 2.39 | 2.30 |
| 65.0             | 165.1                 | 3.47         | 3.42 | 3.36 | 3.31 | 3.25 | 3.19 | 3.12 | 3.06 | 2.99 | 2.92 | 2.85 | 2.77 | 2.70 | 2.62 | 2.54 | 2.46 | 2.37 |
| 65.5             | 166.4                 | 3.54         | 3.48 | 3.43 | 3.37 | 3.31 | 3.25 | 3.19 | 3.12 | 3.06 | 2.99 | 2.91 | 2.84 | 2.76 | 2.69 | 2.61 | 2.52 | 2.44 |
| 66.0             | 167.6                 | 3.60         | 3.55 | 3.50 | 3.44 | 3.38 | 3.32 | 3.26 | 3.19 | 3.12 | 3.05 | 2.98 | 2.91 | 2.83 | 2.75 | 2.67 | 2.59 | 2.50 |
| 66.5             | 168.9                 | 3.67         | 3.62 | 3.56 | 3.51 | 3.45 | 3.39 | 3.32 | 3.26 | 3.19 | 3.12 | 3.05 | 2.97 | 2.90 | 2.82 | 2.74 | 2.66 | 2.57 |
| 67.0             | 170.2                 | 3.74         | 3.69 | 3.63 | 3.57 | 3.52 | 3.45 | 3.39 | 3.33 | 3.26 | 3.19 | 3.12 | 3.04 | 2.97 | 2.89 | 2.81 | 2.72 | 2.64 |
| 67.5             | 171.5                 | 3.81         | 3.76 | 3.70 | 3.64 | 3.59 | 3.52 | 3.46 | 3.40 | 3.33 | 3.26 | 3.19 | 3.11 | 3.04 | 2.96 | 2.88 | 2.79 | 2.71 |
| 68.0             | 172.7                 | 3.87         | 3.82 | 3.77 | 3.71 | 3.65 | 3.59 | 3.53 | 3.46 | 3.39 | 3.32 | 3.25 | 3.18 | 3.10 | 3.02 | 2.94 | 2.86 | 2.77 |
| 68.5             | 174.0                 | 3.94         | 3.89 | 3.84 | 3.78 | 3.72 | 3.66 | 3.60 | 3.53 | 3.46 | 3.39 | 3.32 | 3.25 | 3.17 | 3.09 | 3.01 | 2.93 | 2.85 |
| 69.0             | 175.3                 | 4.02         | 3.96 | 3.91 | 3.85 | 3.79 | 3.73 | 3.67 | 3.60 | 3.53 | 3.47 | 3.39 | 3.32 | 3.24 | 3.16 | 3.08 | 3.00 | 2.92 |
| 69.5             | 176.5                 | 4.08         | 4.03 | 3.97 | 3.92 | 3.86 | 3.80 | 3.73 | 3.67 | 3.60 | 3.53 | 3.46 | 3.39 | 3.31 | 3.23 | 3.15 | 3.07 | 2.98 |
| 70.0             | 177.8                 | 4.15         | 4.10 | 4.05 | 3.99 | 3.93 | 3.87 | 3.81 | 3.74 | 3.67 | 3.60 | 3.53 | 3.46 | 3.38 | 3.30 | 3.22 | 3.14 | 3.06 |
| 70.5             | 179.1                 | 4.23         | 4.17 | 4.12 | 4.06 | 4.00 | 3.94 | 3.88 | 3.81 | 3.75 | 3.68 | 3.60 | 3.53 | 3.45 | 3.38 | 3.30 | 3.21 | 3.13 |
| 71.0             | 180.3                 | 4.29         | 4.24 | 4.19 | 4.13 | 4.07 | 4.01 | 3.95 | 3.88 | 3.81 | 3.74 | 3.67 | 3.60 | 3.52 | 3.44 | 3.36 | 3.28 | 3.20 |
| 71.5             | 181.6                 | 4.37         | 4.32 | 4.26 | 4.20 | 4.15 | 4.08 | 4.02 | 3.96 | 3.89 | 3.82 | 3.75 | 3.67 | 3.60 | 3.52 | 3.44 | 3.35 | 3.27 |
| 72.0             | 182.9                 | 4.44         | 4.39 | 4.34 | 4.28 | 4.22 | 4.16 | 4.10 | 4.03 | 3.96 | 3.89 | 3.82 | 3.75 | 3.67 | 3.59 | 3.51 | 3.43 | 3.34 |
| 72.5             | 184.2                 | 4.52         | 4.46 | 4.41 | 4.35 | 4.29 | 4.23 | 4.17 | 4.10 | 4.04 | 3.97 | 3.90 | 3.82 | 3.75 | 3.67 | 3.59 | 3.50 | 3.42 |
| 73.0             | 185.4                 | 4.59         | 4.53 | 4.48 | 4.42 | 4.36 | 4.30 | 4.24 | 4.17 | 4.11 | 4.04 | 3.97 | 3.89 | 3.81 | 3.74 | 3.66 | 3.57 | 3.49 |
| 73.5             | 186.7                 | 4.66         | 4.61 | 4.56 | 4.50 | 4.44 | 4.38 | 4.32 | 4.25 | 4.18 | 4.11 | 4.04 | 3.97 | 3.89 | 3.81 | 3.73 | 3.65 | 3.56 |
| 74.0             | 188.0                 | 4.74         | 4.69 | 4.63 | 4.58 | 4.52 | 4.46 | 4.39 | 4.33 | 4.26 | 4.19 | 4.12 | 4.04 | 3.97 | 3.89 | 3.81 | 3.73 | 3.64 |
| 74.5             | 189.2                 | 4.81         | 4.76 | 4.70 | 4.65 | 4.59 | 4.53 | 4.46 | 4.40 | 4.33 | 4.26 | 4.19 | 4.11 | 4.04 | 3.96 | 3.88 | 3.80 | 3.71 |
| 75.0             | 190.5                 | 4.89         | 4.84 | 4.78 | 4.72 | 4.66 | 4.60 | 4.54 | 4.48 | 4.41 | 4.34 | 4.27 | 4.19 | 4.12 | 4.04 | 3.96 | 3.87 | 3.79 |
| 75.5             | 191.8                 | 4.97         | 4.91 | 4.86 | 4.80 | 4.74 | 4.68 | 4.62 | 4.55 | 4.49 | 4.42 | 4.34 | 4.27 | 4.19 | 4.12 | 4.03 | 3.95 | 3.87 |
| 76.0             | 193.0                 | 5.04         | 4.99 | 4.93 | 4.87 | 4.82 | 4.75 | 4.69 | 4.63 | 4.56 | 4.49 | 4.42 | 4.34 | 4.27 | 4.19 | 4.11 | 4.02 | 3.94 |
| 76.5             | 194.3                 | 5.12         | 5.06 | 5.01 | 4.95 | 4.89 | 4.83 | 4.77 | 4.70 | 4.64 | 4.57 | 4.50 | 4.42 | 4.35 | 4.27 | 4.19 | 4.10 | 4.02 |
| 77.0             | 195.6                 | 5.20         | 5.14 | 5.09 | 5.03 | 4.97 | 4.91 | 4.85 | 4.78 | 4.72 | 4.65 | 4.57 | 4.50 | 4.42 | 4.35 | 4.27 | 4.18 | 4.10 |
| 77.5             | 196.9                 | 5.28         | 5.22 | 5.17 | 5.11 | 5.05 | 4.99 | 4.93 | 4.86 | 4.80 | 4.73 | 4.66 | 4.58 | 4.50 | 4.43 | 4.35 | 4.26 | 4.18 |
| 78.0             | 198.1                 | 5.35         | 5.30 | 5.24 | 5.19 | 5.13 | 5.07 | 5.00 | 4.94 | 4.87 | 4.80 | 4.73 | 4.66 | 4.58 | 4.50 | 4.42 | 4.34 | 4.25 |
| 78.5             | 199.4                 | 5.43         | 5.38 | 5.33 | 5.27 | 5.21 | 5.15 | 5.09 | 5.02 | 4.95 | 4.88 | 4.81 | 4.74 | 4.66 | 4.58 | 4.50 | 4.42 | 4.33 |
| 79.0             | 200.7                 | 5.51         | 5.46 | 5.41 | 5.35 | 5.29 | 5.23 | 5.17 | 5.10 | 5.03 | 4.96 | 4.89 | 4.82 | 4.74 | 4.66 | 4.58 | 4.50 | 4.42 |
| 79.5             | 201.9                 | 5.59         | 5.54 | 5.48 | 5.43 | 5.37 | 5.31 | 5.24 | 5.18 | 5.11 | 5.04 | 4.97 | 4.89 | 4.82 | 4.74 | 4.66 | 4.58 | 4.49 |
| 80.0             | 203.2                 | 5.67         | 5.62 | 5.57 | 5.51 | 5.45 | 5.39 | 5.33 | 5.26 | 5.19 | 5.12 | 5.05 | 4.98 | 4.90 | 4.82 | 4.74 | 4.66 | 4.57 |
| 80.5             | 204.5                 | 5.76         | 5.70 | 5.65 | 5.59 | 5.53 | 5.47 | 5.41 | 5.34 | 5.28 | 5.21 | 5.13 | 5.06 | 4.98 | 4.91 | 4.82 | 4.74 | 4.66 |
| 81.0             | 205.7                 | 5.83         | 5.78 | 5.73 | 5.67 | 5.61 | 5.55 | 5.49 | 5.42 | 5.35 | 5.28 | 5.21 | 5.14 | 5.06 | 4.98 | 4.90 | 4.82 | 4.73 |
| 81.5             | 207.0                 | 5.92         | 5.86 | 5.81 | 5.75 | 5.69 | 5.63 | 5.57 | 5.50 | 5.44 | 5.37 | 5.30 | 5.22 | 5.15 | 5.07 | 4.99 | 4.90 | 4.82 |
| 82.0             | 208.3                 | 6.00         | 5.95 | 5.89 | 5.84 | 5.78 | 5.72 | 5.65 | 5.59 | 5.52 | 5.45 | 5.38 | 5.31 | 5.23 | 5.15 | 5.07 | 4.99 | 4.90 |
| 82.5             | 209.6                 | 6.09         | 6.03 | 5.98 | 5.92 | 5.86 | 5.80 | 5.74 | 5.67 | 5.61 | 5.54 | 5.47 | 5.39 | 5.32 | 5.24 | 5.16 | 5.07 | 4.99 |

TABLE 1A.—CAUCASIAN MALES FEV-1 LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)

[Reference value equation:  $0.5536 + (-0.01303)(\text{age}) + (-0.000172)(\text{age}^2) + (0.00011607)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 2.29         | 2.23 | 2.16 | 2.10 | 2.04 | 1.97 | 1.90 | 1.84 | 1.76 | 1.69 | 1.62 | 1.55 | 1.47 | 1.39 | 1.32 | 1.24 | 1.15 |
| 61.5             | 156.2                 | 2.33         | 2.27 | 2.21 | 2.15 | 2.08 | 2.02 | 1.95 | 1.88 | 1.81 | 1.74 | 1.67 | 1.59 | 1.52 | 1.44 | 1.36 | 1.28 | 1.20 |
| 62.0             | 157.5                 | 2.38         | 2.32 | 2.26 | 2.20 | 2.13 | 2.07 | 2.00 | 1.93 | 1.86 | 1.79 | 1.71 | 1.64 | 1.57 | 1.49 | 1.41 | 1.33 | 1.25 |
| 62.5             | 158.8                 | 2.43         | 2.37 | 2.31 | 2.24 | 2.18 | 2.11 | 2.05 | 1.98 | 1.91 | 1.84 | 1.76 | 1.69 | 1.61 | 1.54 | 1.46 | 1.38 | 1.30 |
| 63.0             | 160.0                 | 2.47         | 2.41 | 2.35 | 2.29 | 2.22 | 2.16 | 2.09 | 2.02 | 1.95 | 1.88 | 1.81 | 1.73 | 1.66 | 1.58 | 1.50 | 1.42 | 1.34 |
| 63.5             | 161.3                 | 2.52         | 2.46 | 2.40 | 2.34 | 2.27 | 2.21 | 2.14 | 2.07 | 2.00 | 1.93 | 1.86 | 1.78 | 1.71 | 1.63 | 1.55 | 1.47 | 1.39 |
| 64.0             | 162.6                 | 2.57         | 2.51 | 2.45 | 2.39 | 2.32 | 2.25 | 2.19 | 2.12 | 2.05 | 1.98 | 1.90 | 1.83 | 1.75 | 1.68 | 1.60 | 1.52 | 1.44 |
| 64.5             | 163.8                 | 2.62         | 2.56 | 2.49 | 2.43 | 2.37 | 2.30 | 2.23 | 2.16 | 2.09 | 2.02 | 1.95 | 1.88 | 1.80 | 1.72 | 1.64 | 1.56 | 1.48 |
| 65.0             | 165.1                 | 2.67         | 2.61 | 2.54 | 2.48 | 2.42 | 2.35 | 2.28 | 2.21 | 2.14 | 2.07 | 2.00 | 1.93 | 1.85 | 1.77 | 1.69 | 1.61 | 1.53 |
| 65.5             | 166.4                 | 2.71         | 2.65 | 2.59 | 2.53 | 2.46 | 2.40 | 2.33 | 2.26 | 2.19 | 2.12 | 2.05 | 1.97 | 1.90 | 1.82 | 1.74 | 1.66 | 1.58 |
| 66.0             | 167.6                 | 2.76         | 2.70 | 2.64 | 2.58 | 2.51 | 2.45 | 2.38 | 2.31 | 2.24 | 2.17 | 2.10 | 2.02 | 1.95 | 1.87 | 1.79 | 1.71 | 1.63 |



TABLE 1A.—CAUCASIAN MALES FEV<sub>1</sub> LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)—Continued  
 [Reference value equation:  $0.5536 + (-0.01303)(\text{age}) + (-0.000172)(\text{age}^2) + (0.00011607)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 66.5             | 168.9                 | 2.81         | 2.75 | 2.69 | 2.63 | 2.56 | 2.50 | 2.43 | 2.36 | 2.29 | 2.22 | 2.15 | 2.07 | 2.00 | 1.92 | 1.84 | 1.76 | 1.68 |
| 67.0             | 170.2                 | 2.86         | 2.80 | 2.74 | 2.68 | 2.61 | 2.55 | 2.48 | 2.41 | 2.34 | 2.27 | 2.20 | 2.12 | 2.05 | 1.97 | 1.89 | 1.81 | 1.73 |
| 67.5             | 171.5                 | 2.92         | 2.86 | 2.79 | 2.73 | 2.67 | 2.60 | 2.53 | 2.46 | 2.39 | 2.32 | 2.25 | 2.18 | 2.10 | 2.02 | 1.94 | 1.86 | 1.78 |
| 68.0             | 172.7                 | 2.96         | 2.90 | 2.84 | 2.78 | 2.71 | 2.65 | 2.58 | 2.51 | 2.44 | 2.37 | 2.30 | 2.22 | 2.15 | 2.07 | 1.99 | 1.91 | 1.83 |
| 68.5             | 174.0                 | 3.02         | 2.96 | 2.89 | 2.83 | 2.77 | 2.70 | 2.63 | 2.56 | 2.49 | 2.42 | 2.35 | 2.28 | 2.20 | 2.12 | 2.04 | 1.96 | 1.88 |
| 69.0             | 175.3                 | 3.07         | 3.01 | 2.95 | 2.88 | 2.82 | 2.75 | 2.69 | 2.62 | 2.55 | 2.48 | 2.40 | 2.33 | 2.25 | 2.18 | 2.10 | 2.02 | 1.94 |
| 69.5             | 176.5                 | 3.12         | 3.06 | 3.00 | 2.93 | 2.87 | 2.80 | 2.73 | 2.67 | 2.60 | 2.52 | 2.45 | 2.38 | 2.30 | 2.22 | 2.15 | 2.07 | 1.99 |
| 70.0             | 177.8                 | 3.17         | 3.11 | 3.05 | 2.99 | 2.92 | 2.86 | 2.79 | 2.72 | 2.65 | 2.58 | 2.50 | 2.43 | 2.36 | 2.28 | 2.20 | 2.12 | 2.04 |
| 70.5             | 179.1                 | 3.23         | 3.16 | 3.10 | 3.04 | 2.98 | 2.91 | 2.84 | 2.77 | 2.70 | 2.63 | 2.56 | 2.48 | 2.41 | 2.33 | 2.25 | 2.17 | 2.09 |
| 71.0             | 180.3                 | 3.28         | 3.21 | 3.15 | 3.09 | 3.03 | 2.96 | 2.89 | 2.82 | 2.75 | 2.68 | 2.61 | 2.53 | 2.46 | 2.38 | 2.30 | 2.22 | 2.14 |
| 71.5             | 181.6                 | 3.33         | 3.27 | 3.21 | 3.14 | 3.08 | 3.01 | 2.95 | 2.88 | 2.81 | 2.74 | 2.66 | 2.59 | 2.51 | 2.44 | 2.36 | 2.28 | 2.20 |
| 72.0             | 182.9                 | 3.38         | 3.32 | 3.26 | 3.20 | 3.13 | 3.07 | 3.00 | 2.93 | 2.86 | 2.79 | 2.72 | 2.64 | 2.57 | 2.49 | 2.41 | 2.33 | 2.25 |
| 72.5             | 184.2                 | 3.44         | 3.38 | 3.32 | 3.25 | 3.19 | 3.12 | 3.06 | 2.99 | 2.92 | 2.85 | 2.77 | 2.70 | 2.62 | 2.55 | 2.47 | 2.39 | 2.31 |
| 73.0             | 185.4                 | 3.49         | 3.43 | 3.37 | 3.31 | 3.24 | 3.18 | 3.11 | 3.04 | 2.97 | 2.90 | 2.83 | 2.75 | 2.68 | 2.60 | 2.52 | 2.44 | 2.36 |
| 73.5             | 186.7                 | 3.55         | 3.49 | 3.43 | 3.36 | 3.30 | 3.23 | 3.16 | 3.10 | 3.03 | 2.95 | 2.88 | 2.81 | 2.73 | 2.65 | 2.58 | 2.50 | 2.42 |
| 74.0             | 188.0                 | 3.60         | 3.54 | 3.48 | 3.42 | 3.35 | 3.29 | 3.22 | 3.15 | 3.08 | 3.01 | 2.94 | 2.86 | 2.79 | 2.71 | 2.63 | 2.55 | 2.47 |
| 74.5             | 189.2                 | 3.66         | 3.60 | 3.53 | 3.47 | 3.41 | 3.34 | 3.27 | 3.20 | 3.13 | 3.06 | 2.99 | 2.92 | 2.84 | 2.76 | 2.69 | 2.61 | 2.52 |
| 75.0             | 190.5                 | 3.71         | 3.65 | 3.59 | 3.53 | 3.46 | 3.40 | 3.33 | 3.26 | 3.19 | 3.12 | 3.05 | 2.97 | 2.90 | 2.82 | 2.74 | 2.66 | 2.58 |
| 75.5             | 191.8                 | 3.77         | 3.71 | 3.65 | 3.59 | 3.52 | 3.46 | 3.39 | 3.32 | 3.25 | 3.18 | 3.11 | 3.03 | 2.96 | 2.88 | 2.80 | 2.72 | 2.64 |
| 76.0             | 193.0                 | 3.83         | 3.77 | 3.70 | 3.64 | 3.58 | 3.51 | 3.44 | 3.37 | 3.30 | 3.23 | 3.16 | 3.08 | 3.01 | 2.93 | 2.85 | 2.77 | 2.69 |
| 76.5             | 194.3                 | 3.88         | 3.82 | 3.76 | 3.70 | 3.63 | 3.57 | 3.50 | 3.43 | 3.36 | 3.29 | 3.22 | 3.14 | 3.07 | 2.99 | 2.91 | 2.83 | 2.75 |
| 77.0             | 195.6                 | 3.94         | 3.88 | 3.82 | 3.76 | 3.69 | 3.63 | 3.56 | 3.49 | 3.42 | 3.35 | 3.28 | 3.20 | 3.13 | 3.05 | 2.97 | 2.89 | 2.81 |
| 77.5             | 196.9                 | 4.00         | 3.94 | 3.88 | 3.82 | 3.75 | 3.69 | 3.62 | 3.55 | 3.48 | 3.41 | 3.34 | 3.26 | 3.19 | 3.11 | 3.03 | 2.95 | 2.87 |
| 78.0             | 198.1                 | 4.06         | 4.00 | 3.93 | 3.87 | 3.81 | 3.74 | 3.67 | 3.61 | 3.53 | 3.46 | 3.39 | 3.32 | 3.24 | 3.16 | 3.09 | 3.01 | 2.92 |
| 78.5             | 199.4                 | 4.12         | 4.06 | 3.99 | 3.93 | 3.87 | 3.80 | 3.73 | 3.67 | 3.59 | 3.52 | 3.45 | 3.38 | 3.30 | 3.22 | 3.15 | 3.07 | 2.98 |
| 79.0             | 200.7                 | 4.18         | 4.12 | 4.06 | 3.99 | 3.93 | 3.86 | 3.79 | 3.73 | 3.66 | 3.58 | 3.51 | 3.44 | 3.36 | 3.28 | 3.21 | 3.13 | 3.05 |
| 79.5             | 201.9                 | 4.23         | 4.17 | 4.11 | 4.05 | 3.98 | 3.92 | 3.85 | 3.78 | 3.71 | 3.64 | 3.57 | 3.49 | 3.42 | 3.34 | 3.26 | 3.18 | 3.10 |
| 80.0             | 203.2                 | 4.29         | 4.23 | 4.17 | 4.11 | 4.04 | 3.98 | 3.91 | 3.84 | 3.77 | 3.70 | 3.63 | 3.55 | 3.48 | 3.40 | 3.32 | 3.24 | 3.16 |
| 80.5             | 204.5                 | 4.36         | 4.30 | 4.23 | 4.17 | 4.11 | 4.04 | 3.97 | 3.90 | 3.83 | 3.76 | 3.69 | 3.62 | 3.54 | 3.46 | 3.38 | 3.30 | 3.22 |
| 81.0             | 205.7                 | 4.41         | 4.35 | 4.29 | 4.23 | 4.16 | 4.10 | 4.03 | 3.96 | 3.89 | 3.82 | 3.75 | 3.67 | 3.60 | 3.52 | 3.44 | 3.36 | 3.28 |
| 81.5             | 207.0                 | 4.48         | 4.42 | 4.35 | 4.29 | 4.23 | 4.16 | 4.09 | 4.02 | 3.95 | 3.88 | 3.81 | 3.73 | 3.66 | 3.58 | 3.50 | 3.42 | 3.34 |
| 82.0             | 208.3                 | 4.54         | 4.48 | 4.42 | 4.35 | 4.29 | 4.22 | 4.15 | 4.09 | 4.02 | 3.94 | 3.87 | 3.80 | 3.72 | 3.64 | 3.57 | 3.49 | 3.41 |
| 82.5             | 209.6                 | 4.60         | 4.54 | 4.48 | 4.42 | 4.35 | 4.29 | 4.22 | 4.15 | 4.08 | 4.01 | 3.93 | 3.86 | 3.79 | 3.71 | 3.63 | 3.55 | 3.47 |

TABLE 2.—CAUCASIAN FEMALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)  
 [Reference value equation:  $-0.356 + (0.0187)(\text{age}) + (-0.000382)(\text{age}^2) + (0.00012198)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 2.57         | 2.53 | 2.49 | 2.44 | 2.40 | 2.34 | 2.29 | 2.23 | 2.17 | 2.11 | 2.04 | 1.97 | 1.90 | 1.82 | 1.75 | 1.66 | 1.58 |
| 61.5             | 156.2                 | 2.62         | 2.58 | 2.54 | 2.49 | 2.44 | 2.39 | 2.34 | 2.28 | 2.22 | 2.16 | 2.09 | 2.02 | 1.95 | 1.87 | 1.80 | 1.71 | 1.63 |
| 62.0             | 157.5                 | 2.67         | 2.63 | 2.59 | 2.54 | 2.49 | 2.44 | 2.39 | 2.33 | 2.27 | 2.21 | 2.14 | 2.07 | 2.00 | 1.92 | 1.84 | 1.76 | 1.68 |
| 62.5             | 158.8                 | 2.72         | 2.68 | 2.64 | 2.59 | 2.54 | 2.49 | 2.44 | 2.38 | 2.32 | 2.26 | 2.19 | 2.12 | 2.05 | 1.97 | 1.90 | 1.81 | 1.73 |
| 63.0             | 160.0                 | 2.77         | 2.73 | 2.68 | 2.64 | 2.59 | 2.54 | 2.49 | 2.43 | 2.37 | 2.30 | 2.24 | 2.17 | 2.10 | 2.02 | 1.94 | 1.86 | 1.78 |
| 63.5             | 161.3                 | 2.82         | 2.78 | 2.74 | 2.69 | 2.64 | 2.59 | 2.54 | 2.48 | 2.42 | 2.36 | 2.29 | 2.22 | 2.15 | 2.07 | 1.99 | 1.91 | 1.83 |
| 64.0             | 162.6                 | 2.87         | 2.83 | 2.79 | 2.74 | 2.69 | 2.64 | 2.59 | 2.53 | 2.47 | 2.41 | 2.34 | 2.27 | 2.20 | 2.12 | 2.04 | 1.96 | 1.88 |
| 64.5             | 163.8                 | 2.92         | 2.88 | 2.83 | 2.79 | 2.74 | 2.69 | 2.64 | 2.58 | 2.52 | 2.45 | 2.39 | 2.32 | 2.25 | 2.17 | 2.09 | 2.01 | 1.93 |
| 65.0             | 165.1                 | 2.97         | 2.93 | 2.89 | 2.84 | 2.79 | 2.74 | 2.69 | 2.63 | 2.57 | 2.51 | 2.44 | 2.37 | 2.30 | 2.22 | 2.14 | 2.06 | 1.98 |
| 65.5             | 166.4                 | 3.02         | 2.98 | 2.94 | 2.89 | 2.85 | 2.79 | 2.74 | 2.68 | 2.62 | 2.56 | 2.49 | 2.42 | 2.35 | 2.27 | 2.20 | 2.11 | 2.03 |
| 66.0             | 167.6                 | 3.07         | 3.03 | 2.99 | 2.94 | 2.90 | 2.85 | 2.79 | 2.73 | 2.67 | 2.61 | 2.54 | 2.47 | 2.40 | 2.33 | 2.25 | 2.17 | 2.08 |
| 66.5             | 168.9                 | 3.12         | 3.08 | 3.04 | 3.00 | 2.95 | 2.90 | 2.84 | 2.79 | 2.73 | 2.66 | 2.60 | 2.53 | 2.45 | 2.38 | 2.30 | 2.22 | 2.13 |
| 67.0             | 170.2                 | 3.18         | 3.14 | 3.10 | 3.05 | 3.00 | 2.95 | 2.90 | 2.84 | 2.78 | 2.72 | 2.65 | 2.58 | 2.51 | 2.43 | 2.35 | 2.27 | 2.19 |
| 67.5             | 171.5                 | 3.23         | 3.19 | 3.15 | 3.10 | 3.06 | 3.01 | 2.95 | 2.89 | 2.83 | 2.77 | 2.70 | 2.63 | 2.56 | 2.49 | 2.41 | 2.32 | 2.24 |
| 68.0             | 172.7                 | 3.28         | 3.24 | 3.20 | 3.16 | 3.11 | 3.06 | 3.00 | 2.94 | 2.88 | 2.82 | 2.75 | 2.68 | 2.61 | 2.54 | 2.46 | 2.38 | 2.29 |
| 68.5             | 174.0                 | 3.34         | 3.30 | 3.26 | 3.21 | 3.16 | 3.11 | 3.06 | 3.00 | 2.94 | 2.88 | 2.81 | 2.74 | 2.67 | 2.59 | 2.51 | 2.43 | 2.35 |
| 69.0             | 175.3                 | 3.39         | 3.35 | 3.31 | 3.27 | 3.22 | 3.17 | 3.11 | 3.05 | 2.99 | 2.93 | 2.86 | 2.79 | 2.72 | 2.65 | 2.57 | 2.49 | 2.40 |
| 69.5             | 176.5                 | 3.44         | 3.40 | 3.36 | 3.32 | 3.27 | 3.22 | 3.16 | 3.11 | 3.05 | 2.98 | 2.92 | 2.85 | 2.77 | 2.70 | 2.62 | 2.54 | 2.45 |
| 70.0             | 177.8                 | 3.50         | 3.46 | 3.42 | 3.37 | 3.32 | 3.27 | 3.22 | 3.16 | 3.10 | 3.04 | 2.97 | 2.90 | 2.83 | 2.75 | 2.68 | 2.59 | 2.51 |
| 70.5             | 179.1                 | 3.56         | 3.52 | 3.47 | 3.43 | 3.38 | 3.33 | 3.28 | 3.22 | 3.16 | 3.09 | 3.03 | 2.96 | 2.89 | 2.81 | 2.73 | 2.65 | 2.57 |
| 71.0             | 180.3                 | 3.61         | 3.57 | 3.53 | 3.48 | 3.43 | 3.38 | 3.33 | 3.27 | 3.21 | 3.15 | 3.08 | 3.01 | 2.94 | 2.86 | 2.78 | 2.70 | 2.62 |
| 71.5             | 181.6                 | 3.67         | 3.63 | 3.58 | 3.54 | 3.49 | 3.44 | 3.39 | 3.33 | 3.27 | 3.20 | 3.14 | 3.07 | 3.00 | 2.92 | 2.84 | 2.76 | 2.68 |
| 72.0             | 182.9                 | 3.72         | 3.68 | 3.64 | 3.60 | 3.55 | 3.50 | 3.44 | 3.39 | 3.33 | 3.26 | 3.20 | 3.13 | 3.05 | 2.98 | 2.90 | 2.82 | 2.73 |
| 72.5             | 184.2                 | 3.78         | 3.74 | 3.70 | 3.66 | 3.61 | 3.56 | 3.50 | 3.44 | 3.38 | 3.32 | 3.25 | 3.18 | 3.11 | 3.04 | 2.96 | 2.88 | 2.79 |
| 73.0             | 185.4                 | 3.84         | 3.80 | 3.75 | 3.71 | 3.66 | 3.61 | 3.56 | 3.50 | 3.44 | 3.37 | 3.31 | 3.24 | 3.17 | 3.09 | 3.01 | 2.93 | 2.85 |
| 73.5             | 186.7                 | 3.89         | 3.86 | 3.81 | 3.77 | 3.72 | 3.67 | 3.62 | 3.56 | 3.50 | 3.43 | 3.37 | 3.30 | 3.23 | 3.15 | 3.07 | 2.99 | 2.90 |
| 74.0             | 188.0                 | 3.95         | 3.92 | 3.87 | 3.83 | 3.78 | 3.73 | 3.67 | 3.62 | 3.56 | 3.49 | 3.43 | 3.36 | 3.28 | 3.21 | 3.13 | 3.05 | 2.96 |
| 74.5             | 189.2                 | 4.01         | 3.97 | 3.93 | 3.88 | 3.84 | 3.78 | 3.73 | 3.67 | 3.61 | 3.55 | 3.48 | 3.41 | 3.34 | 3.26 | 3.19 | 3.10 | 3.02 |
| 75.0             | 190.5                 | 4.07         | 4.03 | 3.99 | 3.94 | 3.90 | 3.84 | 3.79 | 3.73 | 3.67 | 3.61 | 3.54 | 3.47 | 3.40 | 3.32 | 3.25 | 3.16 | 3.08 |
| 75.5             | 191.8                 | 4.13         | 4.09 | 4.05 | 4.00 | 3.96 | 3.90 | 3.85 | 3.79 | 3.73 | 3.67 | 3.60 | 3.53 | 3.46 | 3.39 | 3.31 | 3.22 | 3.14 |
| 76.0             | 193.0                 | 4.19         | 4.15 | 4.11 | 4.06 | 4.01 | 3.96 | 3.91 | 3.85 | 3.79 | 3.73 | 3.66 | 3.59 | 3.52 | 3.44 | 3.36 | 3.28 | 3.20 |
| 76.5             | 194.3                 | 4.25         | 4.21 | 4.17 | 4.12 | 4.07 | 4.02 | 3.97 | 3.91 | 3.85 | 3.79 | 3.72 | 3.65 | 3.58 | 3.50 | 3.42 | 3.34 | 3.26 |
| 77.0             | 195.6                 | 4.31         | 4.27 | 4.23 | 4.18 | 4.14 | 4.08 | 4.03 | 3.97 | 3.91 | 3.85 | 3.78 | 3.71 | 3.64 | 3.56 | 3.49 | 3.40 | 3.32 |
| 77.5             | 196.9                 | 4.37         | 4.33 | 4.29 | 4.25 | 4.20 | 4.15 | 4.09 | 4.04 | 3.97 | 3.91 | 3.84 | 3.78 | 3.70 | 3.63 | 3.55 | 3.47 | 3.38 |

TABLE 2.—CAUCASIAN FEMALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)—Continued  
 [Reference value equation:  $-0.356 + (0.0187)(\text{age}) + (-0.000382)(\text{age}^2) + (0.00012198)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 78.0             | 198.1                 | 4.43         | 4.39 | 4.35 | 4.30 | 4.26 | 4.20 | 4.15 | 4.09 | 4.03 | 3.97 | 3.90 | 3.83 | 3.76 | 3.68 | 3.61 | 3.52 | 3.44 |
| 78.5             | 199.4                 | 4.49         | 4.45 | 4.41 | 4.37 | 4.32 | 4.27 | 4.21 | 4.16 | 4.10 | 4.03 | 3.97 | 3.90 | 3.82 | 3.75 | 3.67 | 3.59 | 3.50 |
| 79.0             | 200.7                 | 4.56         | 4.52 | 4.48 | 4.43 | 4.38 | 4.33 | 4.28 | 4.22 | 4.16 | 4.10 | 4.03 | 3.96 | 3.89 | 3.81 | 3.73 | 3.65 | 3.57 |
| 79.5             | 201.9                 | 4.62         | 4.58 | 4.53 | 4.49 | 4.44 | 4.39 | 4.34 | 4.28 | 4.22 | 4.15 | 4.09 | 4.02 | 3.95 | 3.87 | 3.79 | 3.71 | 3.62 |
| 80.0             | 203.2                 | 4.68         | 4.64 | 4.60 | 4.55 | 4.51 | 4.45 | 4.40 | 4.34 | 4.28 | 4.22 | 4.15 | 4.08 | 4.01 | 3.93 | 3.86 | 3.77 | 3.69 |
| 80.5             | 204.5                 | 4.74         | 4.71 | 4.66 | 4.62 | 4.57 | 4.52 | 4.46 | 4.41 | 4.35 | 4.28 | 4.22 | 4.15 | 4.07 | 4.00 | 3.92 | 3.84 | 3.75 |
| 81.0             | 205.7                 | 4.80         | 4.77 | 4.72 | 4.68 | 4.63 | 4.58 | 4.52 | 4.47 | 4.41 | 4.34 | 4.28 | 4.21 | 4.13 | 4.06 | 3.98 | 3.90 | 3.81 |
| 81.5             | 207.0                 | 4.87         | 4.83 | 4.79 | 4.74 | 4.70 | 4.64 | 4.59 | 4.53 | 4.47 | 4.41 | 4.34 | 4.27 | 4.20 | 4.12 | 4.05 | 3.96 | 3.88 |
| 82.0             | 208.3                 | 4.94         | 4.90 | 4.85 | 4.81 | 4.76 | 4.71 | 4.66 | 4.60 | 4.54 | 4.47 | 4.41 | 4.34 | 4.27 | 4.19 | 4.11 | 4.03 | 3.94 |
| 82.5             | 209.6                 | 5.00         | 4.96 | 4.92 | 4.88 | 4.83 | 4.78 | 4.72 | 4.66 | 4.60 | 4.54 | 4.47 | 4.40 | 4.33 | 4.26 | 4.18 | 4.10 | 4.01 |

TABLE 2A.—CAUCASIAN FEMALES FEV-1 LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)  
 [Reference value equation:  $0.4333 + (-0.00361)(\text{age}) + (-0.000194)(\text{age}^2) + (0.00009283)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 2.02         | 1.97 | 1.92 | 1.88 | 1.82 | 1.77 | 1.72 | 1.66 | 1.61 | 1.55 | 1.49 | 1.43 | 1.36 | 1.30 | 1.23 | 1.16 | 1.10 |
| 61.5             | 156.2                 | 2.06         | 2.01 | 1.96 | 1.91 | 1.86 | 1.81 | 1.76 | 1.70 | 1.64 | 1.59 | 1.53 | 1.46 | 1.40 | 1.34 | 1.27 | 1.20 | 1.13 |
| 62.0             | 157.5                 | 2.09         | 2.05 | 2.00 | 1.95 | 1.90 | 1.85 | 1.79 | 1.74 | 1.68 | 1.62 | 1.56 | 1.50 | 1.44 | 1.37 | 1.31 | 1.24 | 1.17 |
| 62.5             | 158.8                 | 2.13         | 2.09 | 2.04 | 1.99 | 1.94 | 1.89 | 1.83 | 1.78 | 1.72 | 1.66 | 1.60 | 1.54 | 1.48 | 1.41 | 1.35 | 1.28 | 1.21 |
| 63.0             | 160.0                 | 2.17         | 2.12 | 2.07 | 2.02 | 1.97 | 1.92 | 1.87 | 1.81 | 1.76 | 1.70 | 1.64 | 1.58 | 1.51 | 1.45 | 1.38 | 1.31 | 1.24 |
| 63.5             | 161.3                 | 2.21         | 2.16 | 2.11 | 2.06 | 2.01 | 1.96 | 1.91 | 1.85 | 1.79 | 1.74 | 1.68 | 1.61 | 1.55 | 1.49 | 1.42 | 1.35 | 1.28 |
| 64.0             | 162.6                 | 2.24         | 2.20 | 2.15 | 2.10 | 2.05 | 2.00 | 1.95 | 1.89 | 1.83 | 1.77 | 1.71 | 1.65 | 1.59 | 1.53 | 1.46 | 1.39 | 1.32 |
| 64.5             | 163.8                 | 2.28         | 2.24 | 2.19 | 2.14 | 2.09 | 2.04 | 1.98 | 1.93 | 1.87 | 1.81 | 1.75 | 1.69 | 1.63 | 1.56 | 1.50 | 1.43 | 1.36 |
| 65.0             | 165.1                 | 2.32         | 2.27 | 2.23 | 2.18 | 2.13 | 2.08 | 2.02 | 1.97 | 1.91 | 1.85 | 1.79 | 1.73 | 1.67 | 1.60 | 1.54 | 1.47 | 1.40 |
| 65.5             | 166.4                 | 2.36         | 2.31 | 2.27 | 2.22 | 2.17 | 2.11 | 2.06 | 2.01 | 1.95 | 1.89 | 1.83 | 1.77 | 1.71 | 1.64 | 1.57 | 1.51 | 1.44 |
| 66.0             | 167.6                 | 2.40         | 2.35 | 2.31 | 2.26 | 2.21 | 2.15 | 2.10 | 2.04 | 1.99 | 1.93 | 1.87 | 1.81 | 1.74 | 1.68 | 1.61 | 1.55 | 1.48 |
| 66.5             | 168.9                 | 2.44         | 2.39 | 2.35 | 2.30 | 2.25 | 2.19 | 2.14 | 2.08 | 2.03 | 1.97 | 1.91 | 1.85 | 1.78 | 1.72 | 1.65 | 1.59 | 1.52 |
| 67.0             | 170.2                 | 2.48         | 2.43 | 2.39 | 2.34 | 2.29 | 2.23 | 2.18 | 2.12 | 2.07 | 2.01 | 1.95 | 1.89 | 1.83 | 1.76 | 1.69 | 1.63 | 1.56 |
| 67.5             | 171.5                 | 2.52         | 2.47 | 2.43 | 2.38 | 2.33 | 2.28 | 2.22 | 2.17 | 2.11 | 2.05 | 1.99 | 1.93 | 1.87 | 1.80 | 1.74 | 1.67 | 1.60 |
| 68.0             | 172.7                 | 2.56         | 2.51 | 2.47 | 2.42 | 2.37 | 2.31 | 2.26 | 2.20 | 2.15 | 2.09 | 2.03 | 1.97 | 1.90 | 1.84 | 1.77 | 1.71 | 1.64 |
| 68.5             | 174.0                 | 2.60         | 2.56 | 2.51 | 2.46 | 2.41 | 2.36 | 2.30 | 2.25 | 2.19 | 2.13 | 2.07 | 2.01 | 1.95 | 1.88 | 1.82 | 1.75 | 1.68 |
| 69.0             | 175.3                 | 2.64         | 2.60 | 2.55 | 2.50 | 2.45 | 2.40 | 2.34 | 2.29 | 2.23 | 2.17 | 2.11 | 2.05 | 1.99 | 1.92 | 1.86 | 1.79 | 1.72 |
| 69.5             | 176.5                 | 2.68         | 2.64 | 2.59 | 2.54 | 2.49 | 2.44 | 2.38 | 2.33 | 2.27 | 2.21 | 2.15 | 2.09 | 2.03 | 1.96 | 1.90 | 1.83 | 1.76 |
| 70.0             | 177.8                 | 2.73         | 2.68 | 2.63 | 2.58 | 2.53 | 2.48 | 2.43 | 2.37 | 2.31 | 2.26 | 2.20 | 2.13 | 2.07 | 2.01 | 1.94 | 1.87 | 1.80 |
| 70.5             | 179.1                 | 2.77         | 2.72 | 2.67 | 2.63 | 2.57 | 2.52 | 2.47 | 2.41 | 2.36 | 2.30 | 2.24 | 2.18 | 2.11 | 2.05 | 1.98 | 1.92 | 1.85 |
| 71.0             | 180.3                 | 2.81         | 2.76 | 2.71 | 2.67 | 2.61 | 2.56 | 2.51 | 2.45 | 2.40 | 2.34 | 2.28 | 2.22 | 2.15 | 2.09 | 2.02 | 1.96 | 1.89 |
| 71.5             | 181.6                 | 2.85         | 2.81 | 2.76 | 2.71 | 2.66 | 2.61 | 2.55 | 2.50 | 2.44 | 2.38 | 2.32 | 2.26 | 2.20 | 2.13 | 2.07 | 2.00 | 1.93 |
| 72.0             | 182.9                 | 2.90         | 2.85 | 2.80 | 2.75 | 2.70 | 2.65 | 2.60 | 2.54 | 2.48 | 2.43 | 2.37 | 2.30 | 2.24 | 2.18 | 2.11 | 2.04 | 1.97 |
| 72.5             | 184.2                 | 2.94         | 2.89 | 2.85 | 2.80 | 2.75 | 2.69 | 2.64 | 2.59 | 2.53 | 2.47 | 2.41 | 2.35 | 2.29 | 2.22 | 2.15 | 2.09 | 2.02 |
| 73.0             | 185.4                 | 2.98         | 2.94 | 2.89 | 2.84 | 2.79 | 2.74 | 2.68 | 2.63 | 2.57 | 2.51 | 2.45 | 2.39 | 2.33 | 2.26 | 2.20 | 2.13 | 2.06 |
| 73.5             | 186.7                 | 3.03         | 2.98 | 2.93 | 2.88 | 2.83 | 2.78 | 2.73 | 2.67 | 2.61 | 2.56 | 2.50 | 2.43 | 2.37 | 2.31 | 2.24 | 2.17 | 2.10 |
| 74.0             | 188.0                 | 3.07         | 3.03 | 2.98 | 2.93 | 2.88 | 2.83 | 2.77 | 2.72 | 2.66 | 2.60 | 2.54 | 2.48 | 2.42 | 2.35 | 2.29 | 2.22 | 2.15 |
| 74.5             | 189.2                 | 3.11         | 3.07 | 3.02 | 2.97 | 2.92 | 2.87 | 2.81 | 2.76 | 2.70 | 2.64 | 2.58 | 2.52 | 2.46 | 2.39 | 2.33 | 2.26 | 2.19 |
| 75.0             | 190.5                 | 3.16         | 3.11 | 3.07 | 3.02 | 2.97 | 2.91 | 2.86 | 2.80 | 2.75 | 2.69 | 2.63 | 2.57 | 2.50 | 2.44 | 2.37 | 2.31 | 2.24 |
| 75.5             | 191.8                 | 3.21         | 3.16 | 3.11 | 3.06 | 3.01 | 2.96 | 2.91 | 2.85 | 2.79 | 2.74 | 2.68 | 2.61 | 2.55 | 2.49 | 2.42 | 2.35 | 2.28 |
| 76.0             | 193.0                 | 3.25         | 3.20 | 3.15 | 3.11 | 3.06 | 3.00 | 2.95 | 2.89 | 2.84 | 2.78 | 2.72 | 2.66 | 2.59 | 2.53 | 2.46 | 2.40 | 2.33 |
| 76.5             | 194.3                 | 3.30         | 3.25 | 3.20 | 3.15 | 3.10 | 3.05 | 3.00 | 2.94 | 2.88 | 2.83 | 2.77 | 2.70 | 2.64 | 2.58 | 2.51 | 2.44 | 2.37 |
| 77.0             | 195.6                 | 3.34         | 3.30 | 3.25 | 3.20 | 3.15 | 3.10 | 3.04 | 2.99 | 2.93 | 2.87 | 2.81 | 2.75 | 2.69 | 2.62 | 2.56 | 2.49 | 2.42 |
| 77.5             | 196.9                 | 3.39         | 3.34 | 3.30 | 3.25 | 3.20 | 3.14 | 3.09 | 3.03 | 2.98 | 2.92 | 2.86 | 2.80 | 2.73 | 2.67 | 2.60 | 2.54 | 2.47 |
| 78.0             | 198.1                 | 3.43         | 3.39 | 3.34 | 3.29 | 3.24 | 3.19 | 3.13 | 3.08 | 3.02 | 2.96 | 2.90 | 2.84 | 2.78 | 2.71 | 2.65 | 2.58 | 2.51 |
| 78.5             | 199.4                 | 3.48         | 3.44 | 3.39 | 3.34 | 3.29 | 3.24 | 3.18 | 3.13 | 3.07 | 3.01 | 2.95 | 2.89 | 2.83 | 2.76 | 2.70 | 2.63 | 2.56 |
| 79.0             | 200.7                 | 3.53         | 3.48 | 3.44 | 3.39 | 3.34 | 3.28 | 3.23 | 3.18 | 3.12 | 3.06 | 3.00 | 2.94 | 2.88 | 2.81 | 2.74 | 2.68 | 2.61 |
| 79.5             | 201.9                 | 3.57         | 3.53 | 3.48 | 3.43 | 3.38 | 3.33 | 3.28 | 3.22 | 3.16 | 3.10 | 3.04 | 2.98 | 2.92 | 2.86 | 2.79 | 2.72 | 2.65 |
| 80.0             | 203.2                 | 3.62         | 3.58 | 3.53 | 3.48 | 3.43 | 3.38 | 3.32 | 3.27 | 3.21 | 3.15 | 3.09 | 3.03 | 2.97 | 2.90 | 2.84 | 2.77 | 2.70 |
| 80.5             | 204.5                 | 3.67         | 3.63 | 3.58 | 3.53 | 3.48 | 3.43 | 3.37 | 3.32 | 3.26 | 3.20 | 3.14 | 3.08 | 3.02 | 2.95 | 2.89 | 2.82 | 2.75 |
| 81.0             | 205.7                 | 3.72         | 3.67 | 3.62 | 3.58 | 3.53 | 3.47 | 3.42 | 3.36 | 3.31 | 3.25 | 3.19 | 3.13 | 3.06 | 3.00 | 2.93 | 2.87 | 2.80 |
| 81.5             | 207.0                 | 3.77         | 3.72 | 3.67 | 3.63 | 3.57 | 3.52 | 3.47 | 3.41 | 3.36 | 3.30 | 3.24 | 3.18 | 3.11 | 3.05 | 2.98 | 2.92 | 2.85 |
| 82.0             | 208.3                 | 3.82         | 3.77 | 3.72 | 3.68 | 3.63 | 3.57 | 3.52 | 3.46 | 3.41 | 3.35 | 3.29 | 3.23 | 3.16 | 3.10 | 3.03 | 2.97 | 2.90 |
| 82.5             | 209.6                 | 3.87         | 3.82 | 3.78 | 3.73 | 3.68 | 3.62 | 3.57 | 3.51 | 3.46 | 3.40 | 3.34 | 3.28 | 3.21 | 3.15 | 3.08 | 3.02 | 2.95 |

TABLE 3.—AFRICAN AMERICAN MALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)  
 [Reference value equation:  $-0.1517 + (-0.01821)(\text{age}) + (0.0001367)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 2.24         | 2.20 | 2.16 | 2.13 | 2.09 | 2.05 | 2.02 | 1.98 | 1.94 | 1.91 | 1.87 | 1.84 | 1.80 | 1.76 | 1.73 | 1.69 | 1.65 |
| 61.5             | 156.2                 | 2.29         | 2.25 | 2.22 | 2.18 | 2.15 | 2.11 | 2.07 | 2.04 | 2.00 | 1.96 | 1.93 | 1.89 | 1.85 | 1.82 | 1.78 | 1.74 | 1.71 |
| 62.0             | 157.5                 | 2.35         | 2.31 | 2.27 | 2.24 | 2.20 | 2.16 | 2.13 | 2.09 | 2.06 | 2.02 | 1.98 | 1.95 | 1.91 | 1.87 | 1.84 | 1.80 | 1.76 |

TABLE 3.—AFRICAN AMERICAN MALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)—Continued  
 [Reference value equation:  $-0.1517 + (-0.01821)(\text{age}) + (0.0001367)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 62.5             | 158.8                 | 2.40         | 2.37 | 2.33 | 2.29 | 2.26 | 2.22 | 2.18 | 2.15 | 2.11 | 2.08 | 2.04 | 2.00 | 1.97 | 1.93 | 1.89 | 1.86 | 1.82 |
| 63.0             | 160.0                 | 2.46         | 2.42 | 2.38 | 2.35 | 2.31 | 2.27 | 2.24 | 2.20 | 2.16 | 2.13 | 2.09 | 2.05 | 2.02 | 1.98 | 1.95 | 1.91 | 1.87 |
| 63.5             | 161.3                 | 2.51         | 2.48 | 2.44 | 2.40 | 2.37 | 2.33 | 2.29 | 2.26 | 2.22 | 2.18 | 2.15 | 2.11 | 2.08 | 2.04 | 2.00 | 1.97 | 1.93 |
| 64.0             | 162.6                 | 2.57         | 2.53 | 2.50 | 2.46 | 2.42 | 2.39 | 2.35 | 2.32 | 2.28 | 2.24 | 2.21 | 2.17 | 2.13 | 2.10 | 2.06 | 2.02 | 1.99 |
| 64.5             | 163.8                 | 2.62         | 2.59 | 2.55 | 2.51 | 2.48 | 2.44 | 2.41 | 2.37 | 2.33 | 2.30 | 2.26 | 2.22 | 2.19 | 2.15 | 2.11 | 2.08 | 2.04 |
| 65.0             | 165.1                 | 2.68         | 2.65 | 2.61 | 2.57 | 2.54 | 2.50 | 2.46 | 2.43 | 2.39 | 2.35 | 2.32 | 2.28 | 2.25 | 2.21 | 2.17 | 2.14 | 2.10 |
| 65.5             | 166.4                 | 2.74         | 2.70 | 2.67 | 2.63 | 2.59 | 2.56 | 2.52 | 2.48 | 2.45 | 2.41 | 2.38 | 2.34 | 2.30 | 2.27 | 2.23 | 2.19 | 2.16 |
| 66.0             | 167.6                 | 2.80         | 2.76 | 2.72 | 2.69 | 2.65 | 2.62 | 2.58 | 2.54 | 2.51 | 2.47 | 2.43 | 2.40 | 2.36 | 2.32 | 2.29 | 2.25 | 2.21 |
| 66.5             | 168.9                 | 2.86         | 2.82 | 2.78 | 2.75 | 2.71 | 2.67 | 2.64 | 2.60 | 2.56 | 2.53 | 2.49 | 2.46 | 2.42 | 2.38 | 2.35 | 2.31 | 2.27 |
| 67.0             | 170.2                 | 2.92         | 2.88 | 2.84 | 2.81 | 2.77 | 2.73 | 2.70 | 2.66 | 2.62 | 2.59 | 2.55 | 2.52 | 2.48 | 2.44 | 2.41 | 2.37 | 2.33 |
| 67.5             | 171.5                 | 2.98         | 2.94 | 2.90 | 2.87 | 2.83 | 2.79 | 2.76 | 2.72 | 2.69 | 2.65 | 2.61 | 2.58 | 2.54 | 2.50 | 2.47 | 2.43 | 2.39 |
| 68.0             | 172.7                 | 3.03         | 3.00 | 2.96 | 2.92 | 2.89 | 2.85 | 2.81 | 2.78 | 2.74 | 2.71 | 2.67 | 2.63 | 2.60 | 2.56 | 2.52 | 2.49 | 2.45 |
| 68.5             | 174.0                 | 3.09         | 3.06 | 3.02 | 2.99 | 2.95 | 2.91 | 2.88 | 2.84 | 2.80 | 2.77 | 2.73 | 2.69 | 2.66 | 2.62 | 2.58 | 2.55 | 2.51 |
| 69.0             | 175.3                 | 3.16         | 3.12 | 3.08 | 3.05 | 3.01 | 2.97 | 2.94 | 2.90 | 2.87 | 2.83 | 2.79 | 2.76 | 2.72 | 2.68 | 2.65 | 2.61 | 2.57 |
| 69.5             | 176.5                 | 3.21         | 3.18 | 3.14 | 3.11 | 3.07 | 3.03 | 3.00 | 2.96 | 2.92 | 2.89 | 2.85 | 2.81 | 2.78 | 2.74 | 2.70 | 2.67 | 2.63 |
| 70.0             | 177.8                 | 3.28         | 3.24 | 3.20 | 3.17 | 3.13 | 3.10 | 3.06 | 3.02 | 2.99 | 2.95 | 2.91 | 2.88 | 2.84 | 2.80 | 2.77 | 2.73 | 2.69 |
| 70.5             | 179.1                 | 3.34         | 3.30 | 3.27 | 3.23 | 3.20 | 3.16 | 3.12 | 3.09 | 3.05 | 3.01 | 2.98 | 2.94 | 2.90 | 2.87 | 2.83 | 2.79 | 2.76 |
| 71.0             | 180.3                 | 3.40         | 3.36 | 3.33 | 3.29 | 3.25 | 3.22 | 3.18 | 3.14 | 3.11 | 3.07 | 3.04 | 3.00 | 2.96 | 2.93 | 2.89 | 2.85 | 2.82 |
| 71.5             | 181.6                 | 3.46         | 3.43 | 3.39 | 3.35 | 3.32 | 3.28 | 3.25 | 3.21 | 3.17 | 3.14 | 3.10 | 3.06 | 3.03 | 2.99 | 2.95 | 2.92 | 2.88 |
| 72.0             | 182.9                 | 3.53         | 3.49 | 3.46 | 3.42 | 3.38 | 3.35 | 3.31 | 3.27 | 3.24 | 3.20 | 3.16 | 3.13 | 3.09 | 3.06 | 3.02 | 2.98 | 2.95 |
| 72.5             | 184.2                 | 3.59         | 3.56 | 3.52 | 3.48 | 3.45 | 3.41 | 3.38 | 3.34 | 3.30 | 3.27 | 3.23 | 3.19 | 3.16 | 3.12 | 3.08 | 3.05 | 3.01 |
| 73.0             | 185.4                 | 3.65         | 3.62 | 3.58 | 3.55 | 3.51 | 3.47 | 3.44 | 3.40 | 3.36 | 3.33 | 3.29 | 3.25 | 3.22 | 3.18 | 3.14 | 3.11 | 3.07 |
| 73.5             | 186.7                 | 3.72         | 3.68 | 3.65 | 3.61 | 3.58 | 3.54 | 3.50 | 3.47 | 3.43 | 3.39 | 3.36 | 3.32 | 3.28 | 3.25 | 3.21 | 3.17 | 3.14 |
| 74.0             | 188.0                 | 3.79         | 3.75 | 3.71 | 3.68 | 3.64 | 3.61 | 3.57 | 3.53 | 3.50 | 3.46 | 3.42 | 3.39 | 3.35 | 3.31 | 3.28 | 3.24 | 3.20 |
| 74.5             | 189.2                 | 3.85         | 3.81 | 3.78 | 3.74 | 3.70 | 3.67 | 3.63 | 3.59 | 3.56 | 3.52 | 3.49 | 3.45 | 3.41 | 3.38 | 3.34 | 3.30 | 3.27 |
| 75.0             | 190.5                 | 3.92         | 3.88 | 3.84 | 3.81 | 3.77 | 3.73 | 3.70 | 3.66 | 3.63 | 3.59 | 3.55 | 3.52 | 3.48 | 3.44 | 3.41 | 3.37 | 3.33 |
| 75.5             | 191.8                 | 3.98         | 3.95 | 3.91 | 3.88 | 3.84 | 3.80 | 3.77 | 3.73 | 3.69 | 3.66 | 3.62 | 3.58 | 3.55 | 3.51 | 3.47 | 3.44 | 3.40 |
| 76.0             | 193.0                 | 4.05         | 4.01 | 3.98 | 3.94 | 3.90 | 3.87 | 3.83 | 3.79 | 3.76 | 3.72 | 3.68 | 3.65 | 3.61 | 3.57 | 3.54 | 3.50 | 3.47 |
| 76.5             | 194.3                 | 4.12         | 4.08 | 4.04 | 4.01 | 3.97 | 3.93 | 3.90 | 3.86 | 3.83 | 3.79 | 3.75 | 3.72 | 3.68 | 3.64 | 3.61 | 3.57 | 3.53 |
| 77.0             | 195.6                 | 4.19         | 4.15 | 4.11 | 4.08 | 4.04 | 4.00 | 3.97 | 3.93 | 3.89 | 3.86 | 3.82 | 3.79 | 3.75 | 3.71 | 3.68 | 3.64 | 3.60 |
| 77.5             | 196.9                 | 4.26         | 4.22 | 4.18 | 4.15 | 4.11 | 4.07 | 4.04 | 4.00 | 3.96 | 3.93 | 3.89 | 3.86 | 3.82 | 3.78 | 3.75 | 3.71 | 3.67 |
| 78.0             | 198.1                 | 4.32         | 4.28 | 4.25 | 4.21 | 4.17 | 4.14 | 4.10 | 4.07 | 4.03 | 3.99 | 3.96 | 3.92 | 3.88 | 3.85 | 3.81 | 3.77 | 3.74 |
| 78.5             | 199.4                 | 4.39         | 4.35 | 4.32 | 4.28 | 4.25 | 4.21 | 4.17 | 4.14 | 4.10 | 4.06 | 4.03 | 3.99 | 3.95 | 3.92 | 3.88 | 3.84 | 3.81 |
| 79.0             | 200.7                 | 4.46         | 4.43 | 4.39 | 4.35 | 4.32 | 4.28 | 4.24 | 4.21 | 4.17 | 4.13 | 4.10 | 4.06 | 4.03 | 3.99 | 3.95 | 3.92 | 3.88 |
| 79.5             | 201.9                 | 4.53         | 4.49 | 4.46 | 4.42 | 4.38 | 4.35 | 4.31 | 4.27 | 4.24 | 4.20 | 4.16 | 4.13 | 4.09 | 4.05 | 4.02 | 3.98 | 3.95 |
| 80.0             | 203.2                 | 4.60         | 4.56 | 4.53 | 4.49 | 4.45 | 4.42 | 4.38 | 4.35 | 4.31 | 4.27 | 4.24 | 4.20 | 4.16 | 4.13 | 4.09 | 4.05 | 4.02 |
| 80.5             | 204.5                 | 4.67         | 4.64 | 4.60 | 4.56 | 4.53 | 4.49 | 4.45 | 4.42 | 4.38 | 4.35 | 4.31 | 4.27 | 4.24 | 4.20 | 4.16 | 4.13 | 4.09 |
| 81.0             | 205.7                 | 4.74         | 4.70 | 4.67 | 4.63 | 4.59 | 4.56 | 4.52 | 4.49 | 4.45 | 4.41 | 4.38 | 4.34 | 4.30 | 4.27 | 4.23 | 4.19 | 4.16 |
| 81.5             | 207.0                 | 4.81         | 4.78 | 4.74 | 4.70 | 4.67 | 4.63 | 4.59 | 4.56 | 4.52 | 4.49 | 4.45 | 4.41 | 4.38 | 4.34 | 4.30 | 4.27 | 4.23 |
| 82.0             | 208.3                 | 4.89         | 4.85 | 4.81 | 4.78 | 4.74 | 4.71 | 4.67 | 4.63 | 4.60 | 4.56 | 4.52 | 4.49 | 4.45 | 4.41 | 4.38 | 4.34 | 4.30 |
| 82.5             | 209.6                 | 4.96         | 4.93 | 4.89 | 4.85 | 4.82 | 4.78 | 4.74 | 4.71 | 4.67 | 4.63 | 4.60 | 4.56 | 4.52 | 4.49 | 4.45 | 4.42 | 4.38 |

TABLE 3A.—AFRICAN AMERICAN MALES FEV<sub>1</sub> LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)  
 [Reference value equation:  $0.3411 + (-0.02309)(\text{age}) + (0.00010561)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 1.74         | 1.70 | 1.65 | 1.61 | 1.56 | 1.51 | 1.47 | 1.42 | 1.37 | 1.33 | 1.28 | 1.24 | 1.19 | 1.14 | 1.10 | 1.05 | 1.00 |
| 61.5                   | 156.2                            | 1.79         | 1.74 | 1.69 | 1.65 | 1.60 | 1.56 | 1.51 | 1.46 | 1.42 | 1.37 | 1.32 | 1.28 | 1.23 | 1.19 | 1.14 | 1.09 | 1.05 |
| 62.0                   | 157.5                            | 1.83         | 1.78 | 1.74 | 1.69 | 1.64 | 1.60 | 1.55 | 1.51 | 1.46 | 1.41 | 1.37 | 1.32 | 1.28 | 1.23 | 1.18 | 1.14 | 1.09 |
| 62.5                   | 158.8                            | 1.87         | 1.83 | 1.78 | 1.73 | 1.69 | 1.64 | 1.60 | 1.55 | 1.50 | 1.46 | 1.41 | 1.36 | 1.32 | 1.27 | 1.23 | 1.18 | 1.13 |
| 63.0                   | 160.0                            | 1.91         | 1.87 | 1.82 | 1.77 | 1.73 | 1.68 | 1.64 | 1.59 | 1.54 | 1.50 | 1.45 | 1.41 | 1.36 | 1.31 | 1.27 | 1.22 | 1.17 |
| 63.5                   | 161.3                            | 1.96         | 1.91 | 1.87 | 1.82 | 1.77 | 1.73 | 1.68 | 1.63 | 1.59 | 1.54 | 1.50 | 1.45 | 1.40 | 1.36 | 1.31 | 1.26 | 1.22 |
| 64.0                   | 162.6                            | 2.00         | 1.96 | 1.91 | 1.86 | 1.82 | 1.77 | 1.72 | 1.68 | 1.63 | 1.59 | 1.54 | 1.49 | 1.45 | 1.40 | 1.36 | 1.31 | 1.26 |
| 64.5                   | 163.8                            | 2.04         | 2.00 | 1.95 | 1.90 | 1.86 | 1.81 | 1.77 | 1.72 | 1.67 | 1.63 | 1.58 | 1.54 | 1.49 | 1.44 | 1.40 | 1.35 | 1.30 |
| 65.0                   | 165.1                            | 2.09         | 2.04 | 2.00 | 1.95 | 1.90 | 1.86 | 1.81 | 1.77 | 1.72 | 1.67 | 1.63 | 1.58 | 1.53 | 1.49 | 1.44 | 1.40 | 1.35 |
| 65.5                   | 166.4                            | 2.13         | 2.09 | 2.04 | 1.99 | 1.95 | 1.90 | 1.86 | 1.81 | 1.76 | 1.72 | 1.67 | 1.62 | 1.58 | 1.53 | 1.49 | 1.44 | 1.39 |
| 66.0                   | 167.6                            | 2.18         | 2.13 | 2.09 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 | 1.72 | 1.67 | 1.62 | 1.58 | 1.53 | 1.48 | 1.44 |
| 66.5                   | 168.9                            | 2.22         | 2.18 | 2.13 | 2.08 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 | 1.71 | 1.67 | 1.62 | 1.58 | 1.53 | 1.48 |
| 67.0                   | 170.2                            | 2.27         | 2.22 | 2.18 | 2.13 | 2.08 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 | 1.71 | 1.67 | 1.62 | 1.58 | 1.53 |
| 67.5                   | 171.5                            | 2.32         | 2.27 | 2.22 | 2.18 | 2.13 | 2.09 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 | 1.72 | 1.67 | 1.62 | 1.58 |
| 68.0                   | 172.7                            | 2.36         | 2.31 | 2.27 | 2.22 | 2.17 | 2.13 | 2.08 | 2.04 | 1.99 | 1.94 | 1.90 | 1.85 | 1.81 | 1.76 | 1.71 | 1.67 | 1.62 |
| 68.5                   | 174.0                            | 2.41         | 2.36 | 2.31 | 2.27 | 2.22 | 2.18 | 2.13 | 2.08 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 | 1.71 | 1.67 |
| 69.0                   | 175.3                            | 2.46         | 2.41 | 2.36 | 2.32 | 2.27 | 2.22 | 2.18 | 2.13 | 2.09 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 | 1.72 |
| 69.5                   | 176.5                            | 2.50         | 2.45 | 2.41 | 2.36 | 2.31 | 2.27 | 2.22 | 2.18 | 2.13 | 2.08 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 |
| 70.0                   | 177.8                            | 2.55         | 2.50 | 2.46 | 2.41 | 2.36 | 2.32 | 2.27 | 2.23 | 2.18 | 2.13 | 2.09 | 2.04 | 1.99 | 1.95 | 1.90 | 1.86 | 1.81 |
| 70.5                   | 179.1                            | 2.60         | 2.55 | 2.50 | 2.46 | 2.41 | 2.37 | 2.32 | 2.27 | 2.23 | 2.18 | 2.14 | 2.09 | 2.04 | 2.00 | 1.95 | 1.90 | 1.86 |
| 71.0                   | 180.3                            | 2.64         | 2.60 | 2.55 | 2.50 | 2.46 | 2.41 | 2.37 | 2.32 | 2.27 | 2.23 | 2.18 | 2.13 | 2.09 | 2.04 | 2.00 | 1.95 | 1.90 |
| 71.5                   | 181.6                            | 2.69         | 2.65 | 2.60 | 2.55 | 2.51 | 2.46 | 2.42 | 2.37 | 2.32 | 2.28 | 2.23 | 2.18 | 2.14 | 2.09 | 2.05 | 2.00 | 1.95 |
| 72.0                   | 182.9                            | 2.74         | 2.70 | 2.65 | 2.60 | 2.56 | 2.51 | 2.47 | 2.42 | 2.37 | 2.33 | 2.28 | 2.23 | 2.19 | 2.14 | 2.10 | 2.05 | 2.00 |
| 72.5                   | 184.2                            | 2.79         | 2.75 | 2.70 | 2.65 | 2.61 | 2.56 | 2.52 | 2.47 | 2.42 | 2.38 | 2.33 | 2.29 | 2.24 | 2.19 | 2.15 | 2.10 | 2.05 |
| 73.0                   | 185.4                            | 2.84         | 2.79 | 2.75 | 2.70 | 2.66 | 2.61 | 2.56 | 2.52 | 2.47 | 2.42 | 2.38 | 2.33 | 2.29 | 2.24 | 2.19 | 2.15 | 2.10 |
| 73.5                   | 186.7                            | 2.89         | 2.84 | 2.80 | 2.75 | 2.71 | 2.66 | 2.61 | 2.57 | 2.52 | 2.48 | 2.43 | 2.38 | 2.34 | 2.29 | 2.24 | 2.20 | 2.15 |

TABLE 3A.—AFRICAN AMERICAN MALES FEV-1 LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)—  
Continued[Reference value equation:  $0.3411 + (-0.02309)(\text{age}) + (0.00010561)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 74.0                   | 188.0                            | 2.94         | 2.90 | 2.85 | 2.80 | 2.76 | 2.71 | 2.67 | 2.62 | 2.57 | 2.53 | 2.48 | 2.43 | 2.39 | 2.34 | 2.30 | 2.25 | 2.20 |
| 74.5                   | 189.2                            | 2.99         | 2.94 | 2.90 | 2.85 | 2.81 | 2.76 | 2.71 | 2.67 | 2.62 | 2.57 | 2.53 | 2.48 | 2.44 | 2.39 | 2.34 | 2.30 | 2.25 |
| 75.0                   | 190.5                            | 3.04         | 3.00 | 2.95 | 2.90 | 2.86 | 2.81 | 2.77 | 2.72 | 2.67 | 2.63 | 2.58 | 2.53 | 2.49 | 2.44 | 2.40 | 2.35 | 2.30 |
| 75.5                   | 191.8                            | 3.09         | 3.05 | 3.00 | 2.96 | 2.91 | 2.86 | 2.82 | 2.77 | 2.73 | 2.68 | 2.63 | 2.59 | 2.54 | 2.49 | 2.45 | 2.40 | 2.36 |
| 76.0                   | 193.0                            | 3.14         | 3.10 | 3.05 | 3.01 | 2.96 | 2.91 | 2.87 | 2.82 | 2.77 | 2.73 | 2.68 | 2.64 | 2.59 | 2.54 | 2.50 | 2.45 | 2.40 |
| 76.5                   | 194.3                            | 3.20         | 3.15 | 3.10 | 3.06 | 3.01 | 2.97 | 2.92 | 2.87 | 2.83 | 2.78 | 2.73 | 2.69 | 2.64 | 2.60 | 2.55 | 2.50 | 2.46 |
| 77.0                   | 195.6                            | 3.25         | 3.20 | 3.16 | 3.11 | 3.07 | 3.02 | 2.97 | 2.93 | 2.88 | 2.83 | 2.79 | 2.74 | 2.70 | 2.65 | 2.60 | 2.56 | 2.51 |
| 77.5                   | 196.9                            | 3.30         | 3.26 | 3.21 | 3.17 | 3.12 | 3.07 | 3.03 | 2.98 | 2.93 | 2.89 | 2.84 | 2.80 | 2.75 | 2.70 | 2.66 | 2.61 | 2.57 |
| 78.0                   | 198.1                            | 3.35         | 3.31 | 3.26 | 3.22 | 3.17 | 3.12 | 3.08 | 3.03 | 2.98 | 2.94 | 2.89 | 2.85 | 2.80 | 2.75 | 2.71 | 2.66 | 2.62 |
| 78.5                   | 199.4                            | 3.41         | 3.36 | 3.32 | 3.27 | 3.22 | 3.18 | 3.13 | 3.09 | 3.04 | 2.99 | 2.95 | 2.90 | 2.85 | 2.81 | 2.76 | 2.72 | 2.67 |
| 79.0                   | 200.7                            | 3.46         | 3.42 | 3.37 | 3.33 | 3.28 | 3.23 | 3.19 | 3.14 | 3.09 | 3.05 | 3.00 | 2.96 | 2.91 | 2.86 | 2.82 | 2.77 | 2.72 |
| 79.5                   | 201.9                            | 3.51         | 3.47 | 3.42 | 3.38 | 3.33 | 3.28 | 3.24 | 3.19 | 3.15 | 3.10 | 3.05 | 3.01 | 2.96 | 2.91 | 2.87 | 2.82 | 2.78 |
| 80.0                   | 203.2                            | 3.57         | 3.52 | 3.48 | 3.43 | 3.39 | 3.34 | 3.29 | 3.25 | 3.20 | 3.15 | 3.11 | 3.06 | 3.02 | 2.97 | 2.92 | 2.88 | 2.83 |
| 80.5                   | 204.5                            | 3.63         | 3.58 | 3.53 | 3.49 | 3.44 | 3.40 | 3.35 | 3.30 | 3.26 | 3.21 | 3.16 | 3.12 | 3.07 | 3.03 | 2.98 | 2.93 | 2.89 |
| 81.0                   | 205.7                            | 3.68         | 3.63 | 3.59 | 3.54 | 3.49 | 3.45 | 3.40 | 3.36 | 3.31 | 3.26 | 3.22 | 3.17 | 3.12 | 3.08 | 3.03 | 2.99 | 2.94 |
| 81.5                   | 207.0                            | 3.73         | 3.69 | 3.64 | 3.60 | 3.55 | 3.50 | 3.46 | 3.41 | 3.37 | 3.32 | 3.27 | 3.23 | 3.18 | 3.13 | 3.09 | 3.04 | 3.00 |
| 82.0                   | 208.3                            | 3.79         | 3.75 | 3.70 | 3.65 | 3.61 | 3.56 | 3.51 | 3.47 | 3.42 | 3.38 | 3.33 | 3.28 | 3.24 | 3.19 | 3.15 | 3.10 | 3.05 |
| 82.5                   | 209.6                            | 3.85         | 3.80 | 3.76 | 3.71 | 3.66 | 3.62 | 3.57 | 3.53 | 3.48 | 3.43 | 3.39 | 3.34 | 3.30 | 3.25 | 3.20 | 3.16 | 3.11 |

TABLE 4.—AFRICAN AMERICAN FEMALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)

[Reference value equation:  $-0.3039 + (0.00536)(\text{age}) + (-0.000265)(\text{age}^2) + (0.00010916)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 1.94         | 1.90 | 1.85 | 1.81 | 1.76 | 1.71 | 1.66 | 1.60 | 1.54 | 1.48 | 1.42 | 1.36 | 1.29 | 1.23 | 1.16 | 1.08 | 1.01 |
| 61.5                   | 156.2                            | 1.99         | 1.94 | 1.90 | 1.85 | 1.80 | 1.75 | 1.70 | 1.65 | 1.59 | 1.53 | 1.47 | 1.40 | 1.34 | 1.27 | 1.20 | 1.13 | 1.05 |
| 62.0                   | 157.5                            | 2.03         | 1.99 | 1.94 | 1.90 | 1.85 | 1.80 | 1.74 | 1.69 | 1.63 | 1.57 | 1.51 | 1.45 | 1.38 | 1.32 | 1.25 | 1.17 | 1.10 |
| 62.5                   | 158.8                            | 2.08         | 2.03 | 1.99 | 1.94 | 1.89 | 1.84 | 1.79 | 1.73 | 1.68 | 1.62 | 1.56 | 1.49 | 1.43 | 1.36 | 1.29 | 1.22 | 1.14 |
| 63.0                   | 160.0                            | 2.12         | 2.07 | 2.03 | 1.98 | 1.94 | 1.88 | 1.83 | 1.78 | 1.72 | 1.66 | 1.60 | 1.54 | 1.47 | 1.40 | 1.33 | 1.26 | 1.19 |
| 63.5                   | 161.3                            | 2.16         | 2.12 | 2.08 | 2.03 | 1.98 | 1.93 | 1.88 | 1.82 | 1.76 | 1.71 | 1.64 | 1.58 | 1.52 | 1.45 | 1.38 | 1.31 | 1.23 |
| 64.0                   | 162.6                            | 2.21         | 2.17 | 2.12 | 2.08 | 2.03 | 1.98 | 1.92 | 1.87 | 1.81 | 1.75 | 1.69 | 1.63 | 1.56 | 1.49 | 1.42 | 1.35 | 1.28 |
| 64.5                   | 163.8                            | 2.25         | 2.21 | 2.16 | 2.12 | 2.07 | 2.02 | 1.97 | 1.91 | 1.85 | 1.79 | 1.73 | 1.67 | 1.60 | 1.54 | 1.47 | 1.39 | 1.32 |
| 65.0                   | 165.1                            | 2.30         | 2.26 | 2.21 | 2.16 | 2.12 | 2.07 | 2.01 | 1.96 | 1.90 | 1.84 | 1.78 | 1.72 | 1.65 | 1.58 | 1.51 | 1.44 | 1.37 |
| 65.5                   | 166.4                            | 2.34         | 2.30 | 2.26 | 2.21 | 2.16 | 2.11 | 2.06 | 2.00 | 1.95 | 1.89 | 1.83 | 1.76 | 1.70 | 1.63 | 1.56 | 1.49 | 1.41 |
| 66.0                   | 167.6                            | 2.39         | 2.35 | 2.30 | 2.26 | 2.21 | 2.16 | 2.10 | 2.05 | 1.99 | 1.93 | 1.87 | 1.81 | 1.74 | 1.68 | 1.61 | 1.53 | 1.46 |
| 66.5                   | 168.9                            | 2.44         | 2.39 | 2.35 | 2.30 | 2.26 | 2.20 | 2.15 | 2.10 | 2.04 | 1.98 | 1.92 | 1.86 | 1.79 | 1.72 | 1.65 | 1.58 | 1.51 |
| 67.0                   | 170.2                            | 2.48         | 2.44 | 2.40 | 2.35 | 2.30 | 2.25 | 2.20 | 2.14 | 2.09 | 2.03 | 1.97 | 1.90 | 1.84 | 1.77 | 1.70 | 1.63 | 1.55 |
| 67.5                   | 171.5                            | 2.53         | 2.49 | 2.45 | 2.40 | 2.35 | 2.30 | 2.25 | 2.19 | 2.14 | 2.08 | 2.01 | 1.95 | 1.89 | 1.82 | 1.75 | 1.68 | 1.60 |
| 68.0                   | 172.7                            | 2.58         | 2.54 | 2.49 | 2.45 | 2.40 | 2.35 | 2.29 | 2.24 | 2.18 | 2.12 | 2.06 | 2.00 | 1.93 | 1.86 | 1.79 | 1.72 | 1.65 |
| 68.5                   | 174.0                            | 2.63         | 2.59 | 2.54 | 2.49 | 2.45 | 2.39 | 2.34 | 2.29 | 2.23 | 2.17 | 2.11 | 2.05 | 1.98 | 1.91 | 1.84 | 1.77 | 1.70 |
| 69.0                   | 175.3                            | 2.68         | 2.63 | 2.59 | 2.54 | 2.50 | 2.44 | 2.39 | 2.34 | 2.28 | 2.22 | 2.16 | 2.10 | 2.03 | 1.96 | 1.89 | 1.82 | 1.75 |
| 69.5                   | 176.5                            | 2.72         | 2.68 | 2.64 | 2.59 | 2.54 | 2.49 | 2.44 | 2.38 | 2.33 | 2.27 | 2.20 | 2.14 | 2.08 | 2.01 | 1.94 | 1.87 | 1.79 |
| 70.0                   | 177.8                            | 2.77         | 2.73 | 2.69 | 2.64 | 2.59 | 2.54 | 2.49 | 2.43 | 2.38 | 2.32 | 2.26 | 2.19 | 2.13 | 2.06 | 1.99 | 1.92 | 1.84 |
| 70.5                   | 179.1                            | 2.82         | 2.78 | 2.74 | 2.69 | 2.64 | 2.59 | 2.54 | 2.48 | 2.43 | 2.37 | 2.31 | 2.24 | 2.18 | 2.11 | 2.04 | 1.97 | 1.89 |
| 71.0                   | 180.3                            | 2.87         | 2.83 | 2.78 | 2.74 | 2.69 | 2.64 | 2.59 | 2.53 | 2.47 | 2.41 | 2.35 | 2.29 | 2.22 | 2.16 | 2.09 | 2.01 | 1.94 |
| 71.5                   | 181.6                            | 2.92         | 2.88 | 2.84 | 2.79 | 2.74 | 2.69 | 2.64 | 2.58 | 2.52 | 2.47 | 2.40 | 2.34 | 2.28 | 2.21 | 2.14 | 2.07 | 1.99 |
| 72.0                   | 182.9                            | 2.97         | 2.93 | 2.89 | 2.84 | 2.79 | 2.74 | 2.69 | 2.63 | 2.58 | 2.52 | 2.46 | 2.39 | 2.33 | 2.26 | 2.19 | 2.12 | 2.04 |
| 72.5                   | 184.2                            | 3.03         | 2.98 | 2.94 | 2.89 | 2.84 | 2.79 | 2.74 | 2.69 | 2.63 | 2.57 | 2.51 | 2.44 | 2.38 | 2.31 | 2.24 | 2.17 | 2.10 |
| 73.0                   | 185.4                            | 3.07         | 3.03 | 2.99 | 2.94 | 2.89 | 2.84 | 2.79 | 2.73 | 2.68 | 2.62 | 2.56 | 2.49 | 2.43 | 2.36 | 2.29 | 2.22 | 2.14 |
| 73.5                   | 186.7                            | 3.13         | 3.09 | 3.04 | 2.99 | 2.95 | 2.89 | 2.84 | 2.79 | 2.73 | 2.67 | 2.61 | 2.55 | 2.48 | 2.41 | 2.34 | 2.27 | 2.20 |
| 74.0                   | 188.0                            | 3.18         | 3.14 | 3.09 | 3.05 | 3.00 | 2.95 | 2.90 | 2.84 | 2.78 | 2.72 | 2.66 | 2.60 | 2.53 | 2.47 | 2.40 | 2.32 | 2.25 |
| 74.5                   | 189.2                            | 3.23         | 3.19 | 3.14 | 3.10 | 3.05 | 3.00 | 2.94 | 2.89 | 2.83 | 2.77 | 2.71 | 2.65 | 2.58 | 2.52 | 2.45 | 2.37 | 2.30 |
| 75.0                   | 190.5                            | 3.28         | 3.24 | 3.20 | 3.15 | 3.10 | 3.05 | 3.00 | 2.94 | 2.89 | 2.83 | 2.77 | 2.70 | 2.64 | 2.57 | 2.50 | 2.43 | 2.35 |
| 75.5                   | 191.8                            | 3.34         | 3.30 | 3.25 | 3.20 | 3.16 | 3.11 | 3.05 | 3.00 | 2.94 | 2.88 | 2.82 | 2.76 | 2.69 | 2.62 | 2.55 | 2.48 | 2.41 |
| 76.0                   | 193.0                            | 3.39         | 3.35 | 3.30 | 3.26 | 3.21 | 3.16 | 3.10 | 3.05 | 2.99 | 2.93 | 2.87 | 2.81 | 2.74 | 2.67 | 2.60 | 2.53 | 2.46 |
| 76.5                   | 194.3                            | 3.44         | 3.40 | 3.36 | 3.31 | 3.26 | 3.21 | 3.16 | 3.10 | 3.05 | 2.99 | 2.93 | 2.86 | 2.80 | 2.73 | 2.66 | 2.59 | 2.51 |
| 77.0                   | 195.6                            | 3.50         | 3.46 | 3.41 | 3.37 | 3.32 | 3.27 | 3.21 | 3.16 | 3.10 | 3.04 | 2.98 | 2.92 | 2.85 | 2.78 | 2.71 | 2.64 | 2.57 |
| 77.5                   | 196.9                            | 3.55         | 3.51 | 3.47 | 3.42 | 3.37 | 3.32 | 3.27 | 3.21 | 3.16 | 3.10 | 3.04 | 2.97 | 2.91 | 2.84 | 2.77 | 2.70 | 2.62 |
| 78.0                   | 198.1                            | 3.61         | 3.56 | 3.52 | 3.47 | 3.42 | 3.37 | 3.32 | 3.27 | 3.21 | 3.15 | 3.09 | 3.02 | 2.96 | 2.89 | 2.82 | 2.75 | 2.68 |
| 78.5                   | 199.4                            | 3.66         | 3.62 | 3.58 | 3.53 | 3.48 | 3.43 | 3.38 | 3.32 | 3.27 | 3.21 | 3.14 | 3.08 | 3.02 | 2.95 | 2.88 | 2.81 | 2.73 |
| 79.0                   | 200.7                            | 3.72         | 3.68 | 3.63 | 3.59 | 3.54 | 3.49 | 3.43 | 3.38 | 3.32 | 3.26 | 3.20 | 3.14 | 3.07 | 3.00 | 2.93 | 2.86 | 2.79 |
| 79.5                   | 201.9                            | 3.77         | 3.73 | 3.69 | 3.64 | 3.59 | 3.54 | 3.49 | 3.43 | 3.37 | 3.32 | 3.25 | 3.19 | 3.12 | 3.06 | 2.99 | 2.92 | 2.84 |
| 80.0                   | 203.2                            | 3.83         | 3.79 | 3.74 | 3.70 | 3.65 | 3.60 | 3.54 | 3.49 | 3.43 | 3.37 | 3.31 | 3.25 | 3.18 | 3.11 | 3.04 | 2.97 | 2.90 |
| 80.5                   | 204.5                            | 3.89         | 3.85 | 3.80 | 3.75 | 3.71 | 3.65 | 3.60 | 3.55 | 3.49 | 3.43 | 3.37 | 3.31 | 3.24 | 3.17 | 3.10 | 3.03 | 2.96 |
| 81.0                   | 205.7                            | 3.94         | 3.90 | 3.85 | 3.81 | 3.76 | 3.71 | 3.66 | 3.60 | 3.54 | 3.48 | 3.42 | 3.36 | 3.29 | 3.23 | 3.16 | 3.08 | 3.01 |
| 81.5                   | 207.0                            | 4.00         | 3.96 | 3.91 | 3.87 | 3.82 | 3.77 | 3.71 | 3.66 | 3.60 | 3.54 | 3.48 | 3.42 | 3.35 | 3.28 | 3.22 | 3.14 | 3.07 |
| 82.0                   | 208.3                            | 4.06         | 4.02 | 3.97 | 3.93 | 3.88 | 3.83 | 3.77 | 3.72 | 3.66 | 3.60 | 3.54 | 3.48 | 3.41 | 3.34 | 3.27 | 3.20 | 3.13 |
| 82.5                   | 209.6                            | 4.12         | 4.08 | 4.03 | 3.98 | 3.94 | 3.89 | 3.83 | 3.78 | 3.72 | 3.66 | 3.60 | 3.54 | 3.47 | 3.40 | 3.33 | 3.26 | 3.19 |

TABLE 4A.—AFRICAN AMERICAN FEMALES FEV-1 LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)

[Reference value equation:  $0.3433 + (-0.01283)(\text{age}) + (-0.000097)(\text{age}^2) + (0.00008546)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 1.53         | 1.49 | 1.44 | 1.39 | 1.35 | 1.30 | 1.25 | 1.20 | 1.15 | 1.10 | 1.05 | 0.99 | 0.94 | 0.89 | 0.83 | 0.77 | 0.72 |
| 61.5             | 156.2                 | 1.57         | 1.52 | 1.48 | 1.43 | 1.38 | 1.33 | 1.28 | 1.24 | 1.18 | 1.13 | 1.08 | 1.03 | 0.97 | 0.92 | 0.87 | 0.81 | 0.75 |
| 62.0             | 157.5                 | 1.60         | 1.56 | 1.51 | 1.46 | 1.42 | 1.37 | 1.32 | 1.27 | 1.22 | 1.17 | 1.12 | 1.06 | 1.01 | 0.96 | 0.90 | 0.84 | 0.79 |
| 62.5             | 158.8                 | 1.64         | 1.59 | 1.55 | 1.50 | 1.45 | 1.40 | 1.35 | 1.31 | 1.25 | 1.20 | 1.15 | 1.10 | 1.04 | 0.99 | 0.94 | 0.88 | 0.82 |
| 63.0             | 160.0                 | 1.67         | 1.62 | 1.58 | 1.53 | 1.48 | 1.44 | 1.39 | 1.34 | 1.29 | 1.24 | 1.18 | 1.13 | 1.08 | 1.02 | 0.97 | 0.91 | 0.86 |
| 63.5             | 161.3                 | 1.71         | 1.66 | 1.61 | 1.57 | 1.52 | 1.47 | 1.42 | 1.37 | 1.32 | 1.27 | 1.22 | 1.17 | 1.11 | 1.06 | 1.00 | 0.95 | 0.89 |
| 64.0             | 162.6                 | 1.74         | 1.70 | 1.65 | 1.60 | 1.56 | 1.51 | 1.46 | 1.41 | 1.36 | 1.31 | 1.26 | 1.20 | 1.15 | 1.09 | 1.04 | 0.98 | 0.93 |
| 64.5             | 163.8                 | 1.77         | 1.73 | 1.68 | 1.64 | 1.59 | 1.54 | 1.49 | 1.44 | 1.39 | 1.34 | 1.29 | 1.24 | 1.18 | 1.13 | 1.07 | 1.02 | 0.96 |
| 65.0             | 165.1                 | 1.81         | 1.77 | 1.72 | 1.67 | 1.63 | 1.58 | 1.53 | 1.48 | 1.43 | 1.38 | 1.33 | 1.27 | 1.22 | 1.16 | 1.11 | 1.05 | 1.00 |
| 65.5             | 166.4                 | 1.85         | 1.80 | 1.76 | 1.71 | 1.66 | 1.61 | 1.57 | 1.52 | 1.46 | 1.41 | 1.36 | 1.31 | 1.26 | 1.20 | 1.15 | 1.09 | 1.03 |
| 66.0             | 167.6                 | 1.88         | 1.84 | 1.79 | 1.75 | 1.70 | 1.65 | 1.60 | 1.55 | 1.50 | 1.45 | 1.40 | 1.35 | 1.29 | 1.24 | 1.18 | 1.13 | 1.07 |
| 66.5             | 168.9                 | 1.92         | 1.87 | 1.83 | 1.78 | 1.74 | 1.69 | 1.64 | 1.59 | 1.54 | 1.49 | 1.43 | 1.38 | 1.33 | 1.27 | 1.22 | 1.16 | 1.11 |
| 67.0             | 170.2                 | 1.96         | 1.91 | 1.87 | 1.82 | 1.77 | 1.72 | 1.68 | 1.63 | 1.58 | 1.52 | 1.47 | 1.42 | 1.37 | 1.31 | 1.26 | 1.20 | 1.14 |
| 67.5             | 171.5                 | 2.00         | 1.95 | 1.90 | 1.86 | 1.81 | 1.76 | 1.71 | 1.66 | 1.61 | 1.56 | 1.51 | 1.46 | 1.40 | 1.35 | 1.29 | 1.24 | 1.18 |
| 68.0             | 172.7                 | 2.03         | 1.99 | 1.94 | 1.89 | 1.85 | 1.80 | 1.75 | 1.70 | 1.65 | 1.60 | 1.55 | 1.49 | 1.44 | 1.38 | 1.33 | 1.27 | 1.22 |
| 68.5             | 174.0                 | 2.07         | 2.02 | 1.98 | 1.93 | 1.88 | 1.84 | 1.79 | 1.74 | 1.69 | 1.64 | 1.58 | 1.53 | 1.48 | 1.42 | 1.37 | 1.31 | 1.26 |
| 69.0             | 175.3                 | 2.11         | 2.06 | 2.02 | 1.97 | 1.92 | 1.87 | 1.83 | 1.78 | 1.73 | 1.67 | 1.62 | 1.57 | 1.52 | 1.46 | 1.41 | 1.35 | 1.29 |
| 69.5             | 176.5                 | 2.14         | 2.10 | 2.05 | 2.01 | 1.96 | 1.91 | 1.86 | 1.81 | 1.76 | 1.71 | 1.66 | 1.61 | 1.55 | 1.50 | 1.44 | 1.39 | 1.33 |
| 70.0             | 177.8                 | 2.18         | 2.14 | 2.09 | 2.05 | 2.00 | 1.95 | 1.90 | 1.85 | 1.80 | 1.75 | 1.70 | 1.65 | 1.59 | 1.54 | 1.48 | 1.43 | 1.37 |
| 70.5             | 179.1                 | 2.22         | 2.18 | 2.13 | 2.09 | 2.04 | 1.99 | 1.94 | 1.89 | 1.84 | 1.79 | 1.74 | 1.68 | 1.63 | 1.58 | 1.52 | 1.47 | 1.41 |
| 71.0             | 180.3                 | 2.26         | 2.21 | 2.17 | 2.12 | 2.07 | 2.03 | 1.98 | 1.93 | 1.88 | 1.83 | 1.77 | 1.72 | 1.67 | 1.61 | 1.56 | 1.50 | 1.45 |
| 71.5             | 181.6                 | 2.30         | 2.26 | 2.21 | 2.16 | 2.12 | 2.07 | 2.02 | 1.97 | 1.92 | 1.87 | 1.81 | 1.76 | 1.71 | 1.65 | 1.60 | 1.54 | 1.49 |
| 72.0             | 182.9                 | 2.34         | 2.30 | 2.25 | 2.20 | 2.16 | 2.11 | 2.06 | 2.01 | 1.96 | 1.91 | 1.86 | 1.80 | 1.75 | 1.69 | 1.64 | 1.58 | 1.53 |
| 72.5             | 184.2                 | 2.38         | 2.34 | 2.29 | 2.24 | 2.20 | 2.15 | 2.10 | 2.05 | 2.00 | 1.95 | 1.90 | 1.84 | 1.79 | 1.74 | 1.68 | 1.62 | 1.57 |
| 73.0             | 185.4                 | 2.42         | 2.37 | 2.33 | 2.28 | 2.23 | 2.19 | 2.14 | 2.09 | 2.04 | 1.99 | 1.93 | 1.88 | 1.83 | 1.77 | 1.72 | 1.66 | 1.61 |
| 73.5             | 186.7                 | 2.46         | 2.42 | 2.37 | 2.32 | 2.28 | 2.23 | 2.18 | 2.13 | 2.08 | 2.03 | 1.98 | 1.92 | 1.87 | 1.81 | 1.76 | 1.70 | 1.65 |
| 74.0             | 188.0                 | 2.50         | 2.46 | 2.41 | 2.36 | 2.32 | 2.27 | 2.22 | 2.17 | 2.12 | 2.07 | 2.02 | 1.96 | 1.91 | 1.86 | 1.80 | 1.74 | 1.69 |
| 74.5             | 189.2                 | 2.54         | 2.50 | 2.45 | 2.40 | 2.36 | 2.31 | 2.26 | 2.21 | 2.16 | 2.11 | 2.06 | 2.00 | 1.95 | 1.89 | 1.84 | 1.78 | 1.73 |
| 75.0             | 190.5                 | 2.58         | 2.54 | 2.49 | 2.45 | 2.40 | 2.35 | 2.30 | 2.25 | 2.20 | 2.15 | 2.10 | 2.04 | 1.99 | 1.94 | 1.88 | 1.83 | 1.77 |
| 75.5             | 191.8                 | 2.63         | 2.58 | 2.53 | 2.49 | 2.44 | 2.39 | 2.34 | 2.29 | 2.24 | 2.19 | 2.14 | 2.09 | 2.03 | 1.98 | 1.92 | 1.87 | 1.81 |
| 76.0             | 193.0                 | 2.67         | 2.62 | 2.57 | 2.53 | 2.48 | 2.43 | 2.38 | 2.33 | 2.28 | 2.23 | 2.18 | 2.13 | 2.07 | 2.02 | 1.96 | 1.91 | 1.85 |
| 76.5             | 194.3                 | 2.71         | 2.66 | 2.62 | 2.57 | 2.52 | 2.48 | 2.43 | 2.38 | 2.33 | 2.27 | 2.22 | 2.17 | 2.12 | 2.06 | 2.01 | 1.95 | 1.89 |
| 77.0             | 195.6                 | 2.75         | 2.71 | 2.66 | 2.61 | 2.57 | 2.52 | 2.47 | 2.42 | 2.37 | 2.32 | 2.27 | 2.21 | 2.16 | 2.11 | 2.05 | 1.99 | 1.94 |
| 77.5             | 196.9                 | 2.79         | 2.75 | 2.70 | 2.66 | 2.61 | 2.56 | 2.51 | 2.46 | 2.41 | 2.36 | 2.31 | 2.26 | 2.20 | 2.15 | 2.09 | 2.04 | 1.98 |
| 78.0             | 198.1                 | 2.84         | 2.79 | 2.74 | 2.70 | 2.65 | 2.60 | 2.55 | 2.50 | 2.45 | 2.40 | 2.35 | 2.30 | 2.24 | 2.19 | 2.13 | 2.08 | 2.02 |
| 78.5             | 199.4                 | 2.88         | 2.83 | 2.79 | 2.74 | 2.69 | 2.65 | 2.60 | 2.55 | 2.50 | 2.45 | 2.39 | 2.34 | 2.29 | 2.23 | 2.18 | 2.12 | 2.07 |
| 79.0             | 200.7                 | 2.92         | 2.88 | 2.83 | 2.79 | 2.74 | 2.69 | 2.64 | 2.59 | 2.54 | 2.49 | 2.44 | 2.39 | 2.33 | 2.28 | 2.22 | 2.17 | 2.11 |
| 79.5             | 201.9                 | 2.97         | 2.92 | 2.87 | 2.83 | 2.78 | 2.73 | 2.68 | 2.63 | 2.58 | 2.53 | 2.48 | 2.43 | 2.37 | 2.32 | 2.26 | 2.21 | 2.15 |
| 80.0             | 203.2                 | 3.01         | 2.97 | 2.92 | 2.87 | 2.83 | 2.78 | 2.73 | 2.68 | 2.63 | 2.58 | 2.52 | 2.47 | 2.42 | 2.36 | 2.31 | 2.25 | 2.20 |
| 80.5             | 204.5                 | 3.06         | 3.01 | 2.96 | 2.92 | 2.87 | 2.82 | 2.77 | 2.72 | 2.67 | 2.62 | 2.57 | 2.52 | 2.46 | 2.41 | 2.35 | 2.30 | 2.24 |
| 81.0             | 205.7                 | 3.10         | 3.05 | 3.01 | 2.96 | 2.91 | 2.86 | 2.82 | 2.77 | 2.72 | 2.66 | 2.61 | 2.56 | 2.51 | 2.45 | 2.40 | 2.34 | 2.28 |
| 81.5             | 207.0                 | 3.14         | 3.10 | 3.05 | 3.01 | 2.96 | 2.91 | 2.86 | 2.81 | 2.76 | 2.71 | 2.66 | 2.61 | 2.55 | 2.50 | 2.44 | 2.39 | 2.33 |
| 82.0             | 208.3                 | 3.19         | 3.14 | 3.10 | 3.05 | 3.00 | 2.96 | 2.91 | 2.86 | 2.81 | 2.76 | 2.70 | 2.65 | 2.60 | 2.54 | 2.49 | 2.43 | 2.38 |
| 82.5             | 209.6                 | 3.24         | 3.19 | 3.15 | 3.10 | 3.05 | 3.00 | 2.95 | 2.90 | 2.85 | 2.80 | 2.75 | 2.70 | 2.64 | 2.59 | 2.53 | 2.48 | 2.42 |

TABLE 5.—MEXICAN AMERICAN MALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)

[Reference value equation:  $0.2376 + (-0.00891)(\text{age}) + (-0.00182)(\text{age}^2) + (0.0014947)(\text{height}^2)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 2.95         | 2.90 | 2.84 | 2.78 | 2.72 | 2.66 | 2.60 | 2.54 | 2.48 | 2.41 | 2.34 | 2.27 | 2.20 | 2.13 | 2.06 | 1.98 | 1.91 |
| 61.5             | 156.2                 | 3.01         | 2.96 | 2.90 | 2.84 | 2.79 | 2.73 | 2.66 | 2.60 | 2.54 | 2.47 | 2.40 | 2.33 | 2.26 | 2.19 | 2.12 | 2.04 | 1.97 |
| 62.0             | 157.5                 | 3.07         | 3.02 | 2.96 | 2.90 | 2.85 | 2.79 | 2.72 | 2.66 | 2.60 | 2.53 | 2.46 | 2.40 | 2.33 | 2.25 | 2.18 | 2.11 | 2.03 |
| 62.5             | 158.8                 | 3.13         | 3.08 | 3.02 | 2.97 | 2.91 | 2.85 | 2.79 | 2.72 | 2.66 | 2.59 | 2.53 | 2.46 | 2.39 | 2.31 | 2.24 | 2.17 | 2.09 |
| 63.0             | 160.0                 | 3.19         | 3.14 | 3.08 | 3.02 | 2.96 | 2.90 | 2.84 | 2.78 | 2.72 | 2.65 | 2.58 | 2.51 | 2.44 | 2.37 | 2.30 | 2.22 | 2.15 |
| 63.5             | 161.3                 | 3.25         | 3.20 | 3.14 | 3.09 | 3.03 | 2.97 | 2.91 | 2.84 | 2.78 | 2.71 | 2.65 | 2.58 | 2.51 | 2.43 | 2.36 | 2.29 | 2.21 |
| 64.0             | 162.6                 | 3.32         | 3.26 | 3.21 | 3.15 | 3.09 | 3.03 | 2.97 | 2.91 | 2.84 | 2.78 | 2.71 | 2.64 | 2.57 | 2.50 | 2.42 | 2.35 | 2.27 |
| 64.5             | 163.8                 | 3.37         | 3.32 | 3.26 | 3.21 | 3.15 | 3.09 | 3.03 | 2.96 | 2.90 | 2.83 | 2.77 | 2.70 | 2.63 | 2.56 | 2.48 | 2.41 | 2.33 |
| 65.0             | 165.1                 | 3.44         | 3.38 | 3.33 | 3.27 | 3.21 | 3.15 | 3.09 | 3.03 | 2.96 | 2.90 | 2.83 | 2.76 | 2.69 | 2.62 | 2.55 | 2.47 | 2.40 |
| 65.5             | 166.4                 | 3.50         | 3.45 | 3.39 | 3.33 | 3.28 | 3.22 | 3.15 | 3.09 | 3.03 | 2.96 | 2.89 | 2.82 | 2.75 | 2.68 | 2.61 | 2.54 | 2.46 |
| 66.0             | 167.6                 | 3.56         | 3.51 | 3.45 | 3.40 | 3.34 | 3.28 | 3.22 | 3.15 | 3.09 | 3.02 | 2.96 | 2.89 | 2.82 | 2.75 | 2.67 | 2.60 | 2.52 |
| 66.5             | 168.9                 | 3.63         | 3.57 | 3.52 | 3.46 | 3.40 | 3.34 | 3.28 | 3.22 | 3.15 | 3.09 | 3.02 | 2.95 | 2.88 | 2.81 | 2.74 | 2.66 | 2.59 |
| 67.0             | 170.2                 | 3.69         | 3.64 | 3.58 | 3.53 | 3.47 | 3.41 | 3.35 | 3.28 | 3.22 | 3.15 | 3.09 | 3.02 | 2.95 | 2.88 | 2.80 | 2.73 | 2.65 |
| 67.5             | 171.5                 | 3.76         | 3.71 | 3.65 | 3.59 | 3.53 | 3.47 | 3.41 | 3.35 | 3.29 | 3.22 | 3.15 | 3.08 | 3.01 | 2.94 | 2.87 | 2.79 | 2.72 |
| 68.0             | 172.7                 | 3.82         | 3.77 | 3.71 | 3.65 | 3.60 | 3.54 | 3.47 | 3.41 | 3.35 | 3.28 | 3.21 | 3.15 | 3.08 | 3.00 | 2.93 | 2.86 | 2.78 |
| 68.5             | 174.0                 | 3.89         | 3.84 | 3.78 | 3.72 | 3.66 | 3.60 | 3.54 | 3.48 | 3.41 | 3.35 | 3.28 | 3.21 | 3.14 | 3.07 | 3.00 | 2.92 | 2.85 |
| 69.0             | 175.3                 | 3.96         | 3.90 | 3.85 | 3.79 | 3.73 | 3.67 | 3.61 | 3.55 | 3.48 | 3.42 | 3.35 | 3.28 | 3.21 | 3.14 | 3.07 | 2.99 | 2.92 |
| 69.5             | 176.5                 | 4.02         | 3.97 | 3.91 | 3.85 | 3.79 | 3.73 | 3.67 | 3.61 | 3.55 | 3.48 | 3.41 | 3.34 | 3.27 | 3.20 | 3.13 | 3.05 | 2.98 |
| 70.0             | 177.8                 | 4.09         | 4.03 | 3.98 | 3.92 | 3.86 | 3.80 | 3.74 | 3.68 | 3.61 | 3.55 | 3.48 | 3.41 | 3.34 | 3.27 | 3.20 | 3.12 | 3.05 |
| 70.5             | 179.1                 | 4.16         | 4.10 | 4.05 | 3.99 | 3.93 | 3.87 | 3.81 | 3.75 | 3.68 | 3.62 | 3.55 | 3.48 | 3.41 | 3.34 | 3.27 | 3.19 | 3.12 |
| 71.0             | 180.3                 | 4.22         | 4.17 | 4.11 | 4.06 | 4.00 | 3.94 | 3.88 | 3.81 | 3.75 | 3.68 | 3.62 | 3.55 | 3.48 | 3.40 | 3.33 | 3.26 | 3.18 |
| 71.5             | 181.6                 | 4.29         | 4.24 | 4.18 | 4.13 | 4.07 | 4.01 | 3.95 | 3.88 | 3.82 | 3.75 | 3.69 | 3.62 | 3.55 | 3.47 | 3.40 | 3.33 | 3.25 |
| 72.0             | 182.9                 | 4.36         | 4.31 | 4.25 | 4.20 | 4.14 | 4.08 | 4.02 | 3.95 | 3.89 | 3.82 | 3.76 | 3.69 | 3.62 | 3.55 | 3.47 | 3.40 | 3.33 |

TABLE 5.—MEXICAN AMERICAN MALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)—Continued  
 [Reference value equation:  $0.2376 + (-0.00891)(\text{age}) + (-0.00182)(\text{age}^2) + (0.0014947)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 72.5                   | 184.2                            | 4.44         | 4.38 | 4.33 | 4.27 | 4.21 | 4.15 | 4.09 | 4.03 | 3.96 | 3.90 | 3.83 | 3.76 | 3.69 | 3.62 | 3.54 | 3.47 | 3.39 |
| 73.0                   | 185.4                            | 4.50         | 4.45 | 4.39 | 4.33 | 4.28 | 4.22 | 4.15 | 4.09 | 4.03 | 3.96 | 3.89 | 3.83 | 3.76 | 3.68 | 3.61 | 3.54 | 3.46 |
| 73.5                   | 186.7                            | 4.57         | 4.52 | 4.46 | 4.41 | 4.35 | 4.29 | 4.23 | 4.16 | 4.10 | 4.03 | 3.97 | 3.90 | 3.83 | 3.76 | 3.68 | 3.61 | 3.53 |
| 74.0                   | 188.0                            | 4.65         | 4.59 | 4.54 | 4.48 | 4.42 | 4.36 | 4.30 | 4.24 | 4.17 | 4.11 | 4.04 | 3.97 | 3.90 | 3.83 | 3.76 | 3.68 | 3.60 |
| 74.5                   | 189.2                            | 4.71         | 4.66 | 4.60 | 4.55 | 4.49 | 4.43 | 4.37 | 4.30 | 4.24 | 4.17 | 4.11 | 4.04 | 3.97 | 3.90 | 3.82 | 3.75 | 3.67 |
| 75.0                   | 190.5                            | 4.79         | 4.73 | 4.68 | 4.62 | 4.56 | 4.50 | 4.44 | 4.38 | 4.31 | 4.25 | 4.18 | 4.11 | 4.04 | 3.97 | 3.90 | 3.82 | 3.75 |
| 75.5                   | 191.8                            | 4.86         | 4.81 | 4.75 | 4.70 | 4.64 | 4.58 | 4.52 | 4.45 | 4.39 | 4.32 | 4.25 | 4.19 | 4.12 | 4.04 | 3.97 | 3.90 | 3.82 |
| 76.0                   | 193.0                            | 4.93         | 4.88 | 4.82 | 4.76 | 4.71 | 4.65 | 4.58 | 4.52 | 4.46 | 4.39 | 4.32 | 4.26 | 4.18 | 4.11 | 4.04 | 3.97 | 3.89 |
| 76.5                   | 194.3                            | 5.01         | 4.95 | 4.90 | 4.84 | 4.78 | 4.72 | 4.66 | 4.60 | 4.53 | 4.47 | 4.40 | 4.33 | 4.26 | 4.19 | 4.12 | 4.04 | 3.96 |
| 77.0                   | 195.6                            | 5.08         | 5.03 | 4.97 | 4.92 | 4.86 | 4.80 | 4.74 | 4.67 | 4.61 | 4.54 | 4.47 | 4.41 | 4.34 | 4.26 | 4.19 | 4.12 | 4.04 |
| 77.5                   | 196.9                            | 5.16         | 5.10 | 5.05 | 4.99 | 4.93 | 4.87 | 4.81 | 4.75 | 4.68 | 4.62 | 4.55 | 4.48 | 4.41 | 4.34 | 4.27 | 4.19 | 4.12 |
| 78.0                   | 198.1                            | 5.23         | 5.18 | 5.12 | 5.06 | 5.00 | 4.94 | 4.88 | 4.82 | 4.76 | 4.69 | 4.62 | 4.55 | 4.48 | 4.41 | 4.34 | 4.26 | 4.19 |
| 78.5                   | 199.4                            | 5.31         | 5.25 | 5.20 | 5.14 | 5.08 | 5.02 | 4.96 | 4.90 | 4.83 | 4.77 | 4.70 | 4.63 | 4.56 | 4.49 | 4.42 | 4.34 | 4.26 |
| 79.0                   | 200.7                            | 5.38         | 5.33 | 5.27 | 5.22 | 5.16 | 5.10 | 5.04 | 4.97 | 4.91 | 4.84 | 4.78 | 4.71 | 4.64 | 4.57 | 4.49 | 4.42 | 4.34 |
| 79.5                   | 201.9                            | 5.46         | 5.40 | 5.35 | 5.29 | 5.23 | 5.17 | 5.11 | 5.05 | 4.98 | 4.92 | 4.85 | 4.78 | 4.71 | 4.64 | 4.57 | 4.49 | 4.41 |
| 80.0                   | 203.2                            | 5.54         | 5.48 | 5.43 | 5.37 | 5.31 | 5.25 | 5.19 | 5.13 | 5.06 | 5.00 | 4.93 | 4.86 | 4.79 | 4.72 | 4.64 | 4.57 | 4.49 |
| 80.5                   | 204.5                            | 5.61         | 5.56 | 5.51 | 5.45 | 5.39 | 5.33 | 5.27 | 5.20 | 5.14 | 5.07 | 5.01 | 4.94 | 4.87 | 4.80 | 4.72 | 4.65 | 4.57 |
| 81.0                   | 205.7                            | 5.69         | 5.63 | 5.58 | 5.52 | 5.46 | 5.40 | 5.34 | 5.28 | 5.21 | 5.15 | 5.08 | 5.01 | 4.94 | 4.87 | 4.80 | 4.72 | 4.65 |
| 81.5                   | 207.0                            | 5.77         | 5.71 | 5.66 | 5.60 | 5.54 | 5.48 | 5.42 | 5.36 | 5.29 | 5.23 | 5.16 | 5.09 | 5.02 | 4.95 | 4.88 | 4.80 | 4.73 |
| 82.0                   | 208.3                            | 5.85         | 5.80 | 5.74 | 5.68 | 5.62 | 5.56 | 5.50 | 5.44 | 5.37 | 5.31 | 5.24 | 5.17 | 5.10 | 5.03 | 4.96 | 4.88 | 4.81 |
| 82.5                   | 209.6                            | 5.93         | 5.88 | 5.82 | 5.76 | 5.70 | 5.64 | 5.58 | 5.52 | 5.46 | 5.39 | 5.32 | 5.25 | 5.18 | 5.11 | 5.04 | 4.96 | 4.89 |

TABLE 5A.—MEXICAN AMERICAN MALES FEV<sub>1</sub> LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)  
 [Reference value equation:  $0.6306 + (-0.02928)(\text{age}) + (0.0001267)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 2.24         | 2.18 | 2.12 | 2.06 | 2.00 | 1.94 | 1.88 | 1.83 | 1.77 | 1.71 | 1.65 | 1.59 | 1.53 | 1.47 | 1.42 | 1.36 | 1.30 |
| 61.5                   | 156.2                            | 2.29         | 2.23 | 2.17 | 2.11 | 2.05 | 1.99 | 1.94 | 1.88 | 1.82 | 1.76 | 1.70 | 1.64 | 1.58 | 1.53 | 1.47 | 1.41 | 1.35 |
| 62.0                   | 157.5                            | 2.34         | 2.28 | 2.22 | 2.16 | 2.10 | 2.05 | 1.99 | 1.93 | 1.87 | 1.81 | 1.75 | 1.69 | 1.64 | 1.58 | 1.52 | 1.46 | 1.40 |
| 62.5                   | 158.8                            | 2.39         | 2.33 | 2.27 | 2.22 | 2.16 | 2.10 | 2.04 | 1.98 | 1.92 | 1.86 | 1.81 | 1.75 | 1.69 | 1.63 | 1.57 | 1.51 | 1.45 |
| 63.0                   | 160.0                            | 2.44         | 2.38 | 2.32 | 2.26 | 2.21 | 2.15 | 2.09 | 2.03 | 1.97 | 1.91 | 1.85 | 1.80 | 1.74 | 1.68 | 1.62 | 1.56 | 1.50 |
| 63.5                   | 161.3                            | 2.49         | 2.43 | 2.38 | 2.32 | 2.26 | 2.20 | 2.14 | 2.08 | 2.02 | 1.97 | 1.91 | 1.85 | 1.79 | 1.73 | 1.67 | 1.61 | 1.56 |
| 64.0                   | 162.6                            | 2.55         | 2.49 | 2.43 | 2.37 | 2.31 | 2.25 | 2.19 | 2.14 | 2.08 | 2.02 | 1.96 | 1.90 | 1.84 | 1.78 | 1.73 | 1.67 | 1.61 |
| 64.5                   | 163.8                            | 2.60         | 2.54 | 2.48 | 2.42 | 2.36 | 2.30 | 2.24 | 2.19 | 2.13 | 2.07 | 2.01 | 1.95 | 1.89 | 1.83 | 1.78 | 1.72 | 1.66 |
| 65.0                   | 165.1                            | 2.65         | 2.59 | 2.53 | 2.47 | 2.42 | 2.36 | 2.30 | 2.24 | 2.18 | 2.12 | 2.06 | 2.01 | 1.95 | 1.89 | 1.83 | 1.77 | 1.71 |
| 65.5                   | 166.4                            | 2.70         | 2.64 | 2.59 | 2.53 | 2.47 | 2.41 | 2.35 | 2.29 | 2.23 | 2.18 | 2.12 | 2.06 | 2.00 | 1.94 | 1.88 | 1.82 | 1.77 |
| 66.0                   | 167.6                            | 2.76         | 2.70 | 2.64 | 2.58 | 2.52 | 2.46 | 2.41 | 2.35 | 2.29 | 2.23 | 2.17 | 2.11 | 2.05 | 2.00 | 1.94 | 1.88 | 1.82 |
| 66.5                   | 168.9                            | 2.81         | 2.75 | 2.69 | 2.64 | 2.58 | 2.52 | 2.46 | 2.40 | 2.34 | 2.28 | 2.23 | 2.17 | 2.11 | 2.05 | 1.99 | 1.93 | 1.87 |
| 67.0                   | 170.2                            | 2.87         | 2.81 | 2.75 | 2.69 | 2.63 | 2.57 | 2.51 | 2.46 | 2.40 | 2.34 | 2.28 | 2.22 | 2.16 | 2.10 | 2.05 | 1.99 | 1.93 |
| 67.5                   | 171.5                            | 2.92         | 2.86 | 2.81 | 2.75 | 2.69 | 2.63 | 2.57 | 2.51 | 2.45 | 2.40 | 2.34 | 2.28 | 2.22 | 2.16 | 2.10 | 2.04 | 1.99 |
| 68.0                   | 172.7                            | 2.97         | 2.92 | 2.86 | 2.80 | 2.74 | 2.68 | 2.62 | 2.56 | 2.51 | 2.45 | 2.39 | 2.33 | 2.27 | 2.21 | 2.15 | 2.10 | 2.04 |
| 68.5                   | 174.0                            | 3.03         | 2.97 | 2.91 | 2.86 | 2.80 | 2.74 | 2.68 | 2.62 | 2.56 | 2.50 | 2.45 | 2.39 | 2.33 | 2.27 | 2.21 | 2.15 | 2.09 |
| 69.0                   | 175.3                            | 3.09         | 3.03 | 2.97 | 2.91 | 2.86 | 2.80 | 2.74 | 2.68 | 2.62 | 2.56 | 2.50 | 2.45 | 2.39 | 2.33 | 2.27 | 2.21 | 2.15 |
| 69.5                   | 176.5                            | 3.14         | 3.08 | 3.03 | 2.97 | 2.91 | 2.85 | 2.79 | 2.73 | 2.67 | 2.62 | 2.56 | 2.50 | 2.44 | 2.38 | 2.32 | 2.26 | 2.21 |
| 70.0                   | 177.8                            | 3.20         | 3.14 | 3.08 | 3.03 | 2.97 | 2.91 | 2.85 | 2.79 | 2.73 | 2.67 | 2.62 | 2.56 | 2.50 | 2.44 | 2.38 | 2.32 | 2.26 |
| 70.5                   | 179.1                            | 3.26         | 3.20 | 3.14 | 3.08 | 3.03 | 2.97 | 2.91 | 2.85 | 2.79 | 2.73 | 2.67 | 2.62 | 2.56 | 2.50 | 2.44 | 2.38 | 2.32 |
| 71.0                   | 180.3                            | 3.31         | 3.26 | 3.20 | 3.14 | 3.08 | 3.02 | 2.96 | 2.90 | 2.85 | 2.79 | 2.73 | 2.67 | 2.61 | 2.55 | 2.49 | 2.44 | 2.38 |
| 71.5                   | 181.6                            | 3.37         | 3.32 | 3.26 | 3.20 | 3.14 | 3.08 | 3.02 | 2.96 | 2.91 | 2.85 | 2.79 | 2.73 | 2.67 | 2.61 | 2.55 | 2.50 | 2.44 |
| 72.0                   | 182.9                            | 3.43         | 3.38 | 3.32 | 3.26 | 3.20 | 3.14 | 3.08 | 3.02 | 2.97 | 2.91 | 2.85 | 2.79 | 2.73 | 2.67 | 2.61 | 2.56 | 2.50 |
| 72.5                   | 184.2                            | 3.49         | 3.44 | 3.38 | 3.32 | 3.26 | 3.20 | 3.14 | 3.08 | 3.03 | 2.97 | 2.91 | 2.85 | 2.79 | 2.73 | 2.67 | 2.62 | 2.56 |
| 73.0                   | 185.4                            | 3.55         | 3.49 | 3.43 | 3.38 | 3.32 | 3.26 | 3.20 | 3.14 | 3.08 | 3.02 | 2.97 | 2.91 | 2.85 | 2.79 | 2.73 | 2.67 | 2.61 |
| 73.5                   | 186.7                            | 3.61         | 3.55 | 3.50 | 3.44 | 3.38 | 3.32 | 3.26 | 3.20 | 3.14 | 3.09 | 3.03 | 2.97 | 2.91 | 2.85 | 2.79 | 2.73 | 2.68 |
| 74.0                   | 188.0                            | 3.67         | 3.62 | 3.56 | 3.50 | 3.44 | 3.38 | 3.32 | 3.26 | 3.21 | 3.15 | 3.09 | 3.03 | 2.97 | 2.91 | 2.85 | 2.80 | 2.74 |
| 74.5                   | 189.2                            | 3.73         | 3.67 | 3.61 | 3.56 | 3.50 | 3.44 | 3.38 | 3.32 | 3.26 | 3.20 | 3.15 | 3.09 | 3.03 | 2.97 | 2.91 | 2.85 | 2.79 |
| 75.0                   | 190.5                            | 3.79         | 3.74 | 3.68 | 3.62 | 3.56 | 3.50 | 3.44 | 3.38 | 3.33 | 3.27 | 3.21 | 3.15 | 3.09 | 3.03 | 2.97 | 2.92 | 2.86 |
| 75.5                   | 191.8                            | 3.86         | 3.80 | 3.74 | 3.68 | 3.62 | 3.56 | 3.51 | 3.45 | 3.39 | 3.33 | 3.27 | 3.21 | 3.15 | 3.10 | 3.04 | 2.98 | 2.92 |
| 76.0                   | 193.0                            | 3.92         | 3.86 | 3.80 | 3.74 | 3.68 | 3.62 | 3.56 | 3.51 | 3.45 | 3.39 | 3.33 | 3.27 | 3.21 | 3.15 | 3.10 | 3.04 | 2.98 |
| 76.5                   | 194.3                            | 3.98         | 3.92 | 3.86 | 3.80 | 3.74 | 3.69 | 3.63 | 3.57 | 3.51 | 3.45 | 3.39 | 3.33 | 3.28 | 3.22 | 3.16 | 3.10 | 3.04 |
| 77.0                   | 195.6                            | 4.04         | 3.98 | 3.93 | 3.87 | 3.81 | 3.75 | 3.69 | 3.63 | 3.57 | 3.52 | 3.46 | 3.40 | 3.34 | 3.28 | 3.22 | 3.16 | 3.11 |
| 77.5                   | 196.9                            | 4.11         | 4.05 | 3.99 | 3.93 | 3.87 | 3.82 | 3.76 | 3.70 | 3.64 | 3.58 | 3.52 | 3.46 | 3.41 | 3.35 | 3.29 | 3.23 | 3.17 |
| 78.0                   | 198.1                            | 4.17         | 4.11 | 4.05 | 3.99 | 3.93 | 3.88 | 3.82 | 3.76 | 3.70 | 3.64 | 3.58 | 3.52 | 3.47 | 3.41 | 3.35 | 3.29 | 3.23 |
| 78.5                   | 199.4                            | 4.23         | 4.17 | 4.12 | 4.06 | 4.00 | 3.94 | 3.88 | 3.82 | 3.77 | 3.71 | 3.65 | 3.59 | 3.53 | 3.47 | 3.41 | 3.36 | 3.30 |
| 79.0                   | 200.7                            | 4.30         | 4.24 | 4.18 | 4.12 | 4.07 | 4.01 | 3.95 | 3.89 | 3.83 | 3.77 | 3.71 | 3.66 | 3.60 | 3.54 | 3.48 | 3.42 | 3.36 |
| 79.5                   | 201.9                            | 4.36         | 4.30 | 4.24 | 4.18 | 4.13 | 4.07 | 4.01 | 3.95 | 3.89 | 3.83 | 3.78 | 3.72 | 3.66 | 3.60 | 3.54 | 3.48 | 3.42 |
| 80.0                   | 203.2                            | 4.43         | 4.37 | 4.31 | 4.25 | 4.19 | 4.13 | 4.08 | 4.02 | 3.96 | 3.90 | 3.84 | 3.78 | 3.72 | 3.67 | 3.61 | 3.55 | 3.49 |
| 80.5                   | 204.5                            | 4.49         | 4.44 | 4.38 | 4.32 | 4.26 | 4.20 | 4.14 | 4.08 | 4.03 | 3.97 | 3.91 | 3.85 | 3.79 | 3.73 | 3.67 | 3.62 | 3.56 |
| 81.0                   | 205.7                            | 4.56         | 4.50 | 4.44 | 4.38 | 4.32 | 4.26 | 4.21 | 4.15 | 4.09 | 4.03 | 3.97 | 3.91 | 3.85 | 3.80 | 3.74 | 3.68 | 3.62 |
| 81.5                   | 207.0                            | 4.62         | 4.57 | 4.51 | 4.45 | 4.39 | 4.33 | 4.27 | 4.21 | 4.16 | 4.10 | 4.04 | 3.98 | 3.92 | 3.86 | 3.81 | 3.75 | 3.69 |
| 82.0                   | 208.3                            | 4.69         | 4.63 | 4.58 | 4.52 | 4.46 | 4.40 | 4.34 | 4.28 | 4.22 | 4.17 | 4.11 | 4.05 | 3.99 | 3.93 | 3.87 | 3.81 | 3.76 |
| 82.5                   | 209.6                            | 4.76         | 4.70 | 4.64 | 4.59 | 4.53 | 4.47 | 4.41 | 4.35 | 4.29 | 4.24 | 4.18 | 4.12 | 4.06 | 4.00 | 3.94 | 3.88 | 3.83 |

TABLE 6.—MEXICAN AMERICAN FEMALES FVC LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)  
 [Reference value equation:  $0.121 + (0.00307)(\text{age}) + (-0.000237)(\text{age}^2) + (0.00011570)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 2.48         | 2.44 | 2.39 | 2.35 | 2.30 | 2.25 | 2.20 | 2.15 | 2.10 | 2.04 | 1.98 | 1.92 | 1.86 | 1.79 | 1.73 | 1.66 | 1.59 |
| 61.5                   | 156.2                            | 2.53         | 2.48 | 2.44 | 2.40 | 2.35 | 2.30 | 2.25 | 2.20 | 2.14 | 2.09 | 2.03 | 1.97 | 1.91 | 1.84 | 1.78 | 1.71 | 1.64 |
| 62.0                   | 157.5                            | 2.57         | 2.53 | 2.49 | 2.44 | 2.40 | 2.35 | 2.30 | 2.24 | 2.19 | 2.13 | 2.07 | 2.01 | 1.95 | 1.89 | 1.82 | 1.75 | 1.68 |
| 62.5                   | 158.8                            | 2.62         | 2.58 | 2.54 | 2.49 | 2.44 | 2.39 | 2.34 | 2.29 | 2.24 | 2.18 | 2.12 | 2.06 | 2.00 | 1.94 | 1.87 | 1.80 | 1.73 |
| 63.0                   | 160.0                            | 2.66         | 2.62 | 2.58 | 2.53 | 2.49 | 2.44 | 2.39 | 2.34 | 2.28 | 2.22 | 2.17 | 2.11 | 2.04 | 1.98 | 1.91 | 1.85 | 1.78 |
| 63.5                   | 161.3                            | 2.71         | 2.67 | 2.63 | 2.58 | 2.54 | 2.49 | 2.44 | 2.38 | 2.33 | 2.27 | 2.21 | 2.15 | 2.09 | 2.03 | 1.96 | 1.89 | 1.82 |
| 64.0                   | 162.6                            | 2.76         | 2.72 | 2.68 | 2.63 | 2.58 | 2.54 | 2.49 | 2.43 | 2.38 | 2.32 | 2.26 | 2.20 | 2.14 | 2.08 | 2.01 | 1.94 | 1.87 |
| 64.5                   | 163.8                            | 2.81         | 2.77 | 2.72 | 2.68 | 2.63 | 2.58 | 2.53 | 2.48 | 2.42 | 2.37 | 2.31 | 2.25 | 2.19 | 2.12 | 2.06 | 1.99 | 1.92 |
| 65.0                   | 165.1                            | 2.86         | 2.81 | 2.77 | 2.73 | 2.68 | 2.63 | 2.58 | 2.53 | 2.47 | 2.42 | 2.36 | 2.30 | 2.24 | 2.17 | 2.11 | 2.04 | 1.97 |
| 65.5                   | 166.4                            | 2.90         | 2.86 | 2.82 | 2.78 | 2.73 | 2.68 | 2.63 | 2.58 | 2.52 | 2.47 | 2.41 | 2.35 | 2.28 | 2.22 | 2.15 | 2.09 | 2.02 |
| 66.0                   | 167.6                            | 2.95         | 2.91 | 2.87 | 2.82 | 2.78 | 2.73 | 2.68 | 2.63 | 2.57 | 2.51 | 2.46 | 2.40 | 2.33 | 2.27 | 2.20 | 2.14 | 2.07 |
| 66.5                   | 168.9                            | 3.00         | 2.96 | 2.92 | 2.87 | 2.83 | 2.78 | 2.73 | 2.67 | 2.62 | 2.56 | 2.51 | 2.45 | 2.38 | 2.32 | 2.25 | 2.19 | 2.12 |
| 67.0                   | 170.2                            | 3.05         | 3.01 | 2.97 | 2.92 | 2.88 | 2.83 | 2.78 | 2.73 | 2.67 | 2.61 | 2.56 | 2.50 | 2.43 | 2.37 | 2.30 | 2.24 | 2.17 |
| 67.5                   | 171.5                            | 3.11         | 3.06 | 3.02 | 2.98 | 2.93 | 2.88 | 2.83 | 2.78 | 2.72 | 2.67 | 2.61 | 2.55 | 2.49 | 2.42 | 2.36 | 2.29 | 2.22 |
| 68.0                   | 172.7                            | 3.15         | 3.11 | 3.07 | 3.02 | 2.98 | 2.93 | 2.88 | 2.82 | 2.77 | 2.71 | 2.66 | 2.60 | 2.53 | 2.47 | 2.40 | 2.34 | 2.27 |
| 68.5                   | 174.0                            | 3.21         | 3.16 | 3.12 | 3.08 | 3.03 | 2.98 | 2.93 | 2.88 | 2.82 | 2.77 | 2.71 | 2.65 | 2.59 | 2.52 | 2.46 | 2.39 | 2.32 |
| 69.0                   | 175.3                            | 3.26         | 3.22 | 3.17 | 3.13 | 3.08 | 3.03 | 2.98 | 2.93 | 2.87 | 2.82 | 2.76 | 2.70 | 2.64 | 2.57 | 2.51 | 2.44 | 2.37 |
| 69.5                   | 176.5                            | 3.31         | 3.27 | 3.22 | 3.18 | 3.13 | 3.08 | 3.03 | 2.98 | 2.92 | 2.87 | 2.81 | 2.75 | 2.69 | 2.62 | 2.56 | 2.49 | 2.42 |
| 70.0                   | 177.8                            | 3.36         | 3.32 | 3.28 | 3.23 | 3.18 | 3.13 | 3.08 | 3.03 | 2.98 | 2.92 | 2.86 | 2.80 | 2.74 | 2.68 | 2.61 | 2.54 | 2.47 |
| 70.5                   | 179.1                            | 3.41         | 3.37 | 3.33 | 3.28 | 3.24 | 3.19 | 3.14 | 3.09 | 3.03 | 2.97 | 2.92 | 2.86 | 2.79 | 2.73 | 2.66 | 2.60 | 2.53 |
| 71.0                   | 180.3                            | 3.46         | 3.42 | 3.38 | 3.33 | 3.29 | 3.24 | 3.19 | 3.13 | 3.08 | 3.02 | 2.97 | 2.91 | 2.84 | 2.78 | 2.71 | 2.65 | 2.58 |
| 71.5                   | 181.6                            | 3.52         | 3.48 | 3.43 | 3.39 | 3.34 | 3.29 | 3.24 | 3.19 | 3.13 | 3.08 | 3.02 | 2.96 | 2.90 | 2.83 | 2.77 | 2.70 | 2.63 |
| 72.0                   | 182.9                            | 3.57         | 3.53 | 3.49 | 3.44 | 3.40 | 3.35 | 3.30 | 3.24 | 3.19 | 3.13 | 3.07 | 3.01 | 2.95 | 2.89 | 2.82 | 2.75 | 2.69 |
| 72.5                   | 184.2                            | 3.63         | 3.59 | 3.54 | 3.50 | 3.45 | 3.40 | 3.35 | 3.30 | 3.24 | 3.19 | 3.13 | 3.07 | 3.01 | 2.94 | 2.88 | 2.81 | 2.74 |
| 73.0                   | 185.4                            | 3.68         | 3.64 | 3.59 | 3.55 | 3.50 | 3.45 | 3.40 | 3.35 | 3.30 | 3.24 | 3.18 | 3.12 | 3.06 | 3.00 | 2.93 | 2.86 | 2.79 |
| 73.5                   | 186.7                            | 3.74         | 3.69 | 3.65 | 3.61 | 3.56 | 3.51 | 3.46 | 3.41 | 3.35 | 3.30 | 3.24 | 3.18 | 3.12 | 3.05 | 2.99 | 2.92 | 2.85 |
| 74.0                   | 188.0                            | 3.79         | 3.75 | 3.71 | 3.66 | 3.62 | 3.57 | 3.52 | 3.46 | 3.41 | 3.35 | 3.29 | 3.23 | 3.17 | 3.11 | 3.04 | 2.97 | 2.90 |
| 74.5                   | 189.2                            | 3.84         | 3.80 | 3.76 | 3.71 | 3.67 | 3.62 | 3.57 | 3.52 | 3.46 | 3.40 | 3.35 | 3.29 | 3.22 | 3.16 | 3.09 | 3.03 | 2.96 |
| 75.0                   | 190.5                            | 3.90         | 3.86 | 3.82 | 3.77 | 3.72 | 3.68 | 3.63 | 3.57 | 3.52 | 3.46 | 3.40 | 3.34 | 3.28 | 3.22 | 3.15 | 3.08 | 3.01 |
| 75.5                   | 191.8                            | 3.96         | 3.92 | 3.87 | 3.83 | 3.78 | 3.73 | 3.68 | 3.63 | 3.58 | 3.52 | 3.46 | 3.40 | 3.34 | 3.27 | 3.21 | 3.14 | 3.07 |
| 76.0                   | 193.0                            | 4.01         | 3.97 | 3.93 | 3.88 | 3.84 | 3.79 | 3.74 | 3.68 | 3.63 | 3.57 | 3.51 | 3.45 | 3.39 | 3.33 | 3.26 | 3.19 | 3.12 |
| 76.5                   | 194.3                            | 4.07         | 4.03 | 3.99 | 3.94 | 3.89 | 3.85 | 3.79 | 3.74 | 3.69 | 3.63 | 3.57 | 3.51 | 3.45 | 3.39 | 3.32 | 3.25 | 3.18 |
| 77.0                   | 195.6                            | 4.13         | 4.09 | 4.04 | 4.00 | 3.95 | 3.90 | 3.85 | 3.80 | 3.75 | 3.69 | 3.63 | 3.57 | 3.51 | 3.44 | 3.38 | 3.31 | 3.24 |
| 77.5                   | 196.9                            | 4.19         | 4.15 | 4.10 | 4.06 | 4.01 | 3.96 | 3.91 | 3.86 | 3.80 | 3.75 | 3.69 | 3.63 | 3.57 | 3.50 | 3.44 | 3.37 | 3.30 |
| 78.0                   | 198.1                            | 4.24         | 4.20 | 4.16 | 4.11 | 4.07 | 4.02 | 3.97 | 3.91 | 3.86 | 3.80 | 3.74 | 3.68 | 3.62 | 3.56 | 3.49 | 3.42 | 3.36 |
| 78.5                   | 199.4                            | 4.30         | 4.26 | 4.22 | 4.17 | 4.13 | 4.08 | 4.03 | 3.97 | 3.92 | 3.86 | 3.80 | 3.74 | 3.68 | 3.62 | 3.55 | 3.48 | 3.41 |
| 79.0                   | 200.7                            | 4.36         | 4.32 | 4.28 | 4.23 | 4.19 | 4.14 | 4.09 | 4.03 | 3.98 | 3.92 | 3.86 | 3.80 | 3.74 | 3.68 | 3.61 | 3.54 | 3.48 |
| 79.5                   | 201.9                            | 4.42         | 4.38 | 4.33 | 4.29 | 4.24 | 4.19 | 4.14 | 4.09 | 4.04 | 3.98 | 3.92 | 3.86 | 3.80 | 3.73 | 3.67 | 3.60 | 3.53 |
| 80.0                   | 203.2                            | 4.48         | 4.44 | 4.40 | 4.35 | 4.30 | 4.25 | 4.20 | 4.15 | 4.10 | 4.04 | 3.98 | 3.92 | 3.86 | 3.80 | 3.73 | 3.66 | 3.59 |
| 80.5                   | 204.5                            | 4.54         | 4.50 | 4.46 | 4.41 | 4.36 | 4.32 | 4.26 | 4.21 | 4.16 | 4.10 | 4.04 | 3.98 | 3.92 | 3.86 | 3.79 | 3.72 | 3.65 |
| 81.0                   | 205.7                            | 4.60         | 4.56 | 4.51 | 4.47 | 4.42 | 4.37 | 4.32 | 4.27 | 4.21 | 4.16 | 4.10 | 4.04 | 3.98 | 3.91 | 3.85 | 3.78 | 3.71 |
| 81.5                   | 207.0                            | 4.66         | 4.62 | 4.58 | 4.53 | 4.48 | 4.43 | 4.38 | 4.33 | 4.28 | 4.22 | 4.16 | 4.10 | 4.04 | 3.98 | 3.91 | 3.84 | 3.77 |
| 82.0                   | 208.3                            | 4.72         | 4.68 | 4.64 | 4.59 | 4.55 | 4.50 | 4.45 | 4.39 | 4.34 | 4.28 | 4.22 | 4.16 | 4.10 | 4.04 | 3.97 | 3.90 | 3.83 |
| 82.5                   | 209.6                            | 4.79         | 4.74 | 4.70 | 4.66 | 4.61 | 4.56 | 4.51 | 4.46 | 4.40 | 4.35 | 4.29 | 4.23 | 4.17 | 4.10 | 4.04 | 3.97 | 3.90 |

TABLE 6A.—MEXICAN AMERICAN FEMALES FEV-1 LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)  
 [Reference value equation:  $0.4529 + (-0.01178)(\text{age}) + (-0.000113)(\text{age}^2) + (0.00009890)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 1.98         | 1.93 | 1.88 | 1.84 | 1.79 | 1.74 | 1.69 | 1.64 | 1.58 | 1.53 | 1.48 | 1.42 | 1.36 | 1.31 | 1.25 | 1.19 | 1.13 |
| 61.5                   | 156.2                            | 2.02         | 1.97 | 1.92 | 1.88 | 1.83 | 1.78 | 1.73 | 1.68 | 1.62 | 1.57 | 1.52 | 1.46 | 1.40 | 1.35 | 1.29 | 1.23 | 1.17 |
| 62.0                   | 157.5                            | 2.06         | 2.01 | 1.96 | 1.92 | 1.87 | 1.82 | 1.77 | 1.72 | 1.66 | 1.61 | 1.56 | 1.50 | 1.44 | 1.39 | 1.33 | 1.27 | 1.21 |
| 62.5                   | 158.8                            | 2.10         | 2.05 | 2.01 | 1.96 | 1.91 | 1.86 | 1.81 | 1.76 | 1.70 | 1.65 | 1.60 | 1.54 | 1.48 | 1.43 | 1.37 | 1.31 | 1.25 |
| 63.0                   | 160.0                            | 2.14         | 2.09 | 2.04 | 2.00 | 1.95 | 1.90 | 1.85 | 1.79 | 1.74 | 1.69 | 1.63 | 1.58 | 1.52 | 1.47 | 1.41 | 1.35 | 1.29 |
| 63.5                   | 161.3                            | 2.18         | 2.13 | 2.08 | 2.04 | 1.99 | 1.94 | 1.89 | 1.84 | 1.78 | 1.73 | 1.68 | 1.62 | 1.56 | 1.51 | 1.45 | 1.39 | 1.33 |
| 64.0                   | 162.6                            | 2.22         | 2.17 | 2.13 | 2.08 | 2.03 | 1.98 | 1.93 | 1.88 | 1.82 | 1.77 | 1.72 | 1.66 | 1.61 | 1.55 | 1.49 | 1.43 | 1.37 |
| 64.5                   | 163.8                            | 2.26         | 2.21 | 2.16 | 2.12 | 2.07 | 2.02 | 1.97 | 1.92 | 1.86 | 1.81 | 1.76 | 1.70 | 1.64 | 1.59 | 1.53 | 1.47 | 1.41 |
| 65.0                   | 165.1                            | 2.30         | 2.25 | 2.21 | 2.16 | 2.11 | 2.06 | 2.01 | 1.96 | 1.91 | 1.85 | 1.80 | 1.74 | 1.69 | 1.63 | 1.57 | 1.51 | 1.45 |
| 65.5                   | 166.4                            | 2.34         | 2.30 | 2.25 | 2.20 | 2.15 | 2.10 | 2.05 | 2.00 | 1.95 | 1.89 | 1.84 | 1.78 | 1.73 | 1.67 | 1.61 | 1.55 | 1.49 |
| 66.0                   | 167.6                            | 2.38         | 2.34 | 2.29 | 2.24 | 2.19 | 2.14 | 2.09 | 2.04 | 1.99 | 1.94 | 1.88 | 1.83 | 1.77 | 1.71 | 1.66 | 1.60 | 1.54 |
| 66.5                   | 168.9                            | 2.43         | 2.38 | 2.33 | 2.28 | 2.24 | 2.19 | 2.14 | 2.08 | 2.03 | 1.98 | 1.92 | 1.87 | 1.81 | 1.76 | 1.70 | 1.64 | 1.58 |
| 67.0                   | 170.2                            | 2.47         | 2.42 | 2.38 | 2.33 | 2.28 | 2.23 | 2.18 | 2.13 | 2.07 | 2.02 | 1.97 | 1.91 | 1.86 | 1.80 | 1.74 | 1.68 | 1.62 |
| 67.5                   | 171.5                            | 2.51         | 2.47 | 2.42 | 2.37 | 2.32 | 2.27 | 2.22 | 2.17 | 2.12 | 2.07 | 2.01 | 1.96 | 1.90 | 1.84 | 1.78 | 1.73 | 1.67 |
| 68.0                   | 172.7                            | 2.55         | 2.51 | 2.46 | 2.41 | 2.36 | 2.31 | 2.26 | 2.21 | 2.16 | 2.11 | 2.05 | 2.00 | 1.94 | 1.88 | 1.83 | 1.77 | 1.71 |
| 68.5                   | 174.0                            | 2.60         | 2.55 | 2.51 | 2.46 | 2.41 | 2.36 | 2.31 | 2.26 | 2.20 | 2.15 | 2.10 | 2.04 | 1.99 | 1.93 | 1.87 | 1.81 | 1.75 |
| 69.0                   | 175.3                            | 2.64         | 2.60 | 2.55 | 2.50 | 2.45 | 2.40 | 2.35 | 2.30 | 2.25 | 2.20 | 2.14 | 2.09 | 2.03 | 1.97 | 1.92 | 1.86 | 1.80 |
| 69.5                   | 176.5                            | 2.69         | 2.64 | 2.59 | 2.54 | 2.50 | 2.45 | 2.39 | 2.34 | 2.29 | 2.24 | 2.18 | 2.13 | 2.07 | 2.01 | 1.96 | 1.90 | 1.84 |
| 70.0                   | 177.8                            | 2.73         | 2.68 | 2.64 | 2.59 | 2.54 | 2.49 | 2.44 | 2.39 | 2.34 | 2.28 | 2.23 | 2.17 | 2.12 | 2.06 | 2.00 | 1.94 | 1.88 |
| 70.5                   | 179.1                            | 2.78         | 2.73 | 2.68 | 2.64 | 2.59 | 2.54 | 2.49 | 2.43 | 2.38 | 2.33 | 2.27 | 2.22 | 2.16 | 2.11 | 2.05 | 1.99 | 1.93 |
| 71.0                   | 180.3                            | 2.82         | 2.77 | 2.73 | 2.68 | 2.63 | 2.58 | 2.53 | 2.48 | 2.42 | 2.37 | 2.32 | 2.26 | 2.21 | 2.15 | 2.09 | 2.03 | 1.97 |
| 71.5                   | 181.6                            | 2.87         | 2.82 | 2.77 | 2.72 | 2.68 | 2.63 | 2.58 | 2.52 | 2.47 | 2.42 | 2.36 | 2.31 | 2.25 | 2.20 | 2.14 | 2.08 | 2.02 |
| 72.0                   | 182.9                            | 2.91         | 2.87 | 2.82 | 2.77 | 2.72 | 2.67 | 2.62 | 2.57 | 2.52 | 2.46 | 2.41 | 2.36 | 2.30 | 2.24 | 2.18 | 2.13 | 2.07 |



TABLE 6A.—MEXICAN AMERICAN FEMALES FEV-1 LOWER LIMIT OF NORMAL VALUES, HANKINSON, ET AL. (1999)—  
Continued[Reference value equation:  $0.4529 + (-0.01178)(\text{age}) + (-0.000113)(\text{age}^2) + (0.00009890)(\text{height}^2)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 72.5                   | 184.2                            | 2.96         | 2.91 | 2.87 | 2.82 | 2.77 | 2.72 | 2.67 | 2.62 | 2.57 | 2.51 | 2.46 | 2.40 | 2.35 | 2.29 | 2.23 | 2.17 | 2.11 |
| 73.0                   | 185.4                            | 3.00         | 2.96 | 2.91 | 2.86 | 2.81 | 2.76 | 2.71 | 2.66 | 2.61 | 2.56 | 2.50 | 2.45 | 2.39 | 2.33 | 2.28 | 2.22 | 2.16 |
| 73.5                   | 186.7                            | 3.05         | 3.01 | 2.96 | 2.91 | 2.86 | 2.81 | 2.76 | 2.71 | 2.66 | 2.60 | 2.55 | 2.49 | 2.44 | 2.38 | 2.32 | 2.26 | 2.20 |
| 74.0                   | 188.0                            | 3.10         | 3.05 | 3.01 | 2.96 | 2.91 | 2.86 | 2.81 | 2.76 | 2.71 | 2.65 | 2.60 | 2.54 | 2.49 | 2.43 | 2.37 | 2.31 | 2.25 |
| 74.5                   | 189.2                            | 3.14         | 3.10 | 3.05 | 3.00 | 2.95 | 2.90 | 2.85 | 2.80 | 2.75 | 2.70 | 2.64 | 2.59 | 2.53 | 2.47 | 2.42 | 2.36 | 2.30 |
| 75.0                   | 190.5                            | 3.19         | 3.15 | 3.10 | 3.05 | 3.00 | 2.95 | 2.90 | 2.85 | 2.80 | 2.75 | 2.69 | 2.64 | 2.58 | 2.52 | 2.46 | 2.41 | 2.35 |
| 75.5                   | 191.8                            | 3.24         | 3.20 | 3.15 | 3.10 | 3.05 | 3.00 | 2.95 | 2.90 | 2.85 | 2.79 | 2.74 | 2.69 | 2.63 | 2.57 | 2.51 | 2.46 | 2.40 |
| 76.0                   | 193.0                            | 3.29         | 3.24 | 3.20 | 3.15 | 3.10 | 3.05 | 3.00 | 2.95 | 2.89 | 2.84 | 2.79 | 2.73 | 2.67 | 2.62 | 2.56 | 2.50 | 2.44 |
| 76.5                   | 194.3                            | 3.34         | 3.29 | 3.24 | 3.20 | 3.15 | 3.10 | 3.05 | 3.00 | 2.94 | 2.89 | 2.84 | 2.78 | 2.72 | 2.67 | 2.61 | 2.55 | 2.49 |
| 77.0                   | 195.6                            | 3.39         | 3.34 | 3.29 | 3.25 | 3.20 | 3.15 | 3.10 | 3.05 | 2.99 | 2.94 | 2.89 | 2.83 | 2.77 | 2.72 | 2.66 | 2.60 | 2.54 |
| 77.5                   | 196.9                            | 3.44         | 3.39 | 3.35 | 3.30 | 3.25 | 3.20 | 3.15 | 3.10 | 3.04 | 2.99 | 2.94 | 2.88 | 2.83 | 2.77 | 2.71 | 2.65 | 2.59 |
| 78.0                   | 198.1                            | 3.49         | 3.44 | 3.39 | 3.34 | 3.30 | 3.25 | 3.20 | 3.14 | 3.09 | 3.04 | 2.98 | 2.93 | 2.87 | 2.81 | 2.76 | 2.70 | 2.64 |
| 78.5                   | 199.4                            | 3.54         | 3.49 | 3.44 | 3.40 | 3.35 | 3.30 | 3.25 | 3.19 | 3.14 | 3.09 | 3.03 | 2.98 | 2.92 | 2.87 | 2.81 | 2.75 | 2.69 |
| 79.0                   | 200.7                            | 3.59         | 3.54 | 3.49 | 3.45 | 3.40 | 3.35 | 3.30 | 3.25 | 3.19 | 3.14 | 3.09 | 3.03 | 2.97 | 2.92 | 2.86 | 2.80 | 2.74 |
| 79.5                   | 201.9                            | 3.64         | 3.59 | 3.54 | 3.49 | 3.45 | 3.40 | 3.35 | 3.29 | 3.24 | 3.19 | 3.13 | 3.08 | 3.02 | 2.97 | 2.91 | 2.85 | 2.79 |
| 80.0                   | 203.2                            | 3.69         | 3.64 | 3.59 | 3.55 | 3.50 | 3.45 | 3.40 | 3.35 | 3.29 | 3.24 | 3.19 | 3.13 | 3.07 | 3.02 | 2.96 | 2.90 | 2.84 |
| 80.5                   | 204.5                            | 3.74         | 3.69 | 3.65 | 3.60 | 3.55 | 3.50 | 3.45 | 3.40 | 3.35 | 3.29 | 3.24 | 3.18 | 3.13 | 3.07 | 3.01 | 2.95 | 2.89 |
| 81.0                   | 205.7                            | 3.79         | 3.74 | 3.70 | 3.65 | 3.60 | 3.55 | 3.50 | 3.45 | 3.39 | 3.34 | 3.29 | 3.23 | 3.18 | 3.12 | 3.06 | 3.00 | 2.94 |
| 81.5                   | 207.0                            | 3.84         | 3.80 | 3.75 | 3.70 | 3.65 | 3.60 | 3.55 | 3.50 | 3.45 | 3.39 | 3.34 | 3.28 | 3.23 | 3.17 | 3.11 | 3.05 | 3.00 |
| 82.0                   | 208.3                            | 3.90         | 3.85 | 3.80 | 3.75 | 3.71 | 3.66 | 3.61 | 3.55 | 3.50 | 3.45 | 3.39 | 3.34 | 3.28 | 3.22 | 3.17 | 3.11 | 3.05 |
| 82.5                   | 209.6                            | 3.95         | 3.90 | 3.86 | 3.81 | 3.76 | 3.71 | 3.66 | 3.61 | 3.55 | 3.50 | 3.45 | 3.39 | 3.34 | 3.28 | 3.22 | 3.16 | 3.10 |

TABLE 7.—NAVAJO MALES FVC LOWER LIMIT OF NORMAL VALUES, CRAPO, ET AL. (1988)

[Reference value equation:  $[-6.2404 + (-0.0264)(\text{age}) + (0.0686)(\text{height})] \times (.817)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 2.53         | 2.48 | 2.44 | 2.40 | 2.35 | 2.31 | 2.27 | 2.22 | 2.18 | 2.14 | 2.09 | 2.05 | 2.01 | 1.97 | 1.92 | 1.88 | 1.84 |
| 61.5                   | 156.2                            | 2.60         | 2.56 | 2.51 | 2.47 | 2.43 | 2.38 | 2.34 | 2.30 | 2.25 | 2.21 | 2.17 | 2.12 | 2.08 | 2.04 | 2.00 | 1.95 | 1.91 |
| 62.0                   | 157.5                            | 2.67         | 2.63 | 2.59 | 2.54 | 2.50 | 2.46 | 2.41 | 2.37 | 2.33 | 2.28 | 2.24 | 2.20 | 2.15 | 2.11 | 2.07 | 2.02 | 1.98 |
| 62.5                   | 158.8                            | 2.74         | 2.70 | 2.66 | 2.62 | 2.57 | 2.53 | 2.49 | 2.44 | 2.40 | 2.36 | 2.31 | 2.27 | 2.23 | 2.18 | 2.14 | 2.10 | 2.05 |
| 63.0                   | 160.0                            | 2.81         | 2.77 | 2.73 | 2.68 | 2.64 | 2.60 | 2.55 | 2.51 | 2.47 | 2.42 | 2.38 | 2.34 | 2.29 | 2.25 | 2.21 | 2.17 | 2.12 |
| 63.5                   | 161.3                            | 2.88         | 2.84 | 2.80 | 2.76 | 2.71 | 2.67 | 2.63 | 2.58 | 2.54 | 2.50 | 2.45 | 2.41 | 2.37 | 2.32 | 2.28 | 2.24 | 2.19 |
| 64.0                   | 162.6                            | 2.96         | 2.91 | 2.87 | 2.83 | 2.79 | 2.74 | 2.70 | 2.66 | 2.61 | 2.57 | 2.53 | 2.48 | 2.44 | 2.40 | 2.35 | 2.31 | 2.27 |
| 64.5                   | 163.8                            | 3.03         | 2.98 | 2.94 | 2.90 | 2.85 | 2.81 | 2.77 | 2.72 | 2.68 | 2.64 | 2.59 | 2.55 | 2.51 | 2.46 | 2.42 | 2.38 | 2.33 |
| 65.0                   | 165.1                            | 3.10         | 3.05 | 3.01 | 2.97 | 2.93 | 2.88 | 2.84 | 2.80 | 2.75 | 2.71 | 2.67 | 2.62 | 2.58 | 2.54 | 2.49 | 2.45 | 2.41 |
| 65.5                   | 166.4                            | 3.17         | 3.13 | 3.08 | 3.04 | 3.00 | 2.95 | 2.91 | 2.87 | 2.82 | 2.78 | 2.74 | 2.69 | 2.65 | 2.61 | 2.57 | 2.52 | 2.48 |
| 66.0                   | 167.6                            | 3.24         | 3.20 | 3.15 | 3.11 | 3.07 | 3.02 | 2.98 | 2.94 | 2.90 | 2.85 | 2.81 | 2.77 | 2.72 | 2.68 | 2.64 | 2.59 | 2.55 |
| 66.5                   | 168.9                            | 3.31         | 3.27 | 3.23 | 3.18 | 3.14 | 3.10 | 3.05 | 3.01 | 2.97 | 2.92 | 2.88 | 2.84 | 2.79 | 2.75 | 2.71 | 2.66 | 2.62 |
| 67.0                   | 170.2                            | 3.38         | 3.34 | 3.30 | 3.25 | 3.21 | 3.17 | 3.12 | 3.08 | 3.04 | 3.00 | 2.95 | 2.91 | 2.87 | 2.82 | 2.78 | 2.74 | 2.69 |
| 67.5                   | 171.5                            | 3.46         | 3.41 | 3.37 | 3.33 | 3.28 | 3.24 | 3.20 | 3.15 | 3.11 | 3.07 | 3.03 | 2.98 | 2.94 | 2.90 | 2.85 | 2.81 | 2.77 |
| 68.0                   | 172.7                            | 3.52         | 3.48 | 3.44 | 3.39 | 3.35 | 3.31 | 3.27 | 3.22 | 3.18 | 3.14 | 3.09 | 3.05 | 3.01 | 2.96 | 2.92 | 2.88 | 2.83 |
| 68.5                   | 174.0                            | 3.60         | 3.55 | 3.51 | 3.47 | 3.42 | 3.38 | 3.34 | 3.29 | 3.25 | 3.21 | 3.17 | 3.12 | 3.08 | 3.04 | 2.99 | 2.95 | 2.91 |
| 69.0                   | 175.3                            | 3.67         | 3.63 | 3.58 | 3.54 | 3.50 | 3.45 | 3.41 | 3.37 | 3.32 | 3.28 | 3.24 | 3.20 | 3.15 | 3.11 | 3.07 | 3.02 | 2.98 |
| 69.5                   | 176.5                            | 3.74         | 3.69 | 3.65 | 3.61 | 3.56 | 3.52 | 3.48 | 3.43 | 3.39 | 3.35 | 3.31 | 3.26 | 3.22 | 3.18 | 3.13 | 3.09 | 3.05 |
| 70.0                   | 177.8                            | 3.81         | 3.77 | 3.72 | 3.68 | 3.64 | 3.59 | 3.55 | 3.51 | 3.46 | 3.42 | 3.38 | 3.34 | 3.29 | 3.25 | 3.21 | 3.16 | 3.12 |
| 70.5                   | 179.1                            | 3.88         | 3.84 | 3.80 | 3.75 | 3.71 | 3.67 | 3.62 | 3.58 | 3.54 | 3.49 | 3.45 | 3.41 | 3.36 | 3.32 | 3.28 | 3.24 | 3.19 |
| 71.0                   | 180.3                            | 3.95         | 3.91 | 3.86 | 3.82 | 3.78 | 3.73 | 3.69 | 3.65 | 3.60 | 3.56 | 3.52 | 3.48 | 3.43 | 3.39 | 3.35 | 3.30 | 3.26 |
| 71.5                   | 181.6                            | 4.02         | 3.98 | 3.94 | 3.89 | 3.85 | 3.81 | 3.76 | 3.72 | 3.68 | 3.63 | 3.59 | 3.55 | 3.51 | 3.46 | 3.42 | 3.38 | 3.33 |
| 72.0                   | 182.9                            | 4.10         | 4.05 | 4.01 | 3.97 | 3.92 | 3.88 | 3.84 | 3.79 | 3.75 | 3.71 | 3.66 | 3.62 | 3.58 | 3.53 | 3.49 | 3.45 | 3.41 |
| 72.5                   | 184.2                            | 4.17         | 4.13 | 4.08 | 4.04 | 4.00 | 3.95 | 3.91 | 3.87 | 3.82 | 3.78 | 3.74 | 3.69 | 3.65 | 3.61 | 3.56 | 3.52 | 3.48 |
| 73.0                   | 185.4                            | 4.24         | 4.19 | 4.15 | 4.11 | 4.06 | 4.02 | 3.98 | 3.93 | 3.89 | 3.85 | 3.80 | 3.76 | 3.72 | 3.67 | 3.63 | 3.59 | 3.55 |
| 73.5                   | 186.7                            | 4.31         | 4.27 | 4.22 | 4.18 | 4.14 | 4.09 | 4.05 | 4.01 | 3.96 | 3.92 | 3.88 | 3.83 | 3.79 | 3.75 | 3.70 | 3.66 | 3.62 |
| 74.0                   | 188.0                            | 4.38         | 4.34 | 4.30 | 4.25 | 4.21 | 4.17 | 4.12 | 4.08 | 4.04 | 3.99 | 3.95 | 3.91 | 3.86 | 3.82 | 3.78 | 3.73 | 3.69 |
| 74.5                   | 189.2                            | 4.45         | 4.41 | 4.36 | 4.32 | 4.28 | 4.23 | 4.19 | 4.15 | 4.10 | 4.06 | 4.02 | 3.97 | 3.93 | 3.89 | 3.84 | 3.80 | 3.76 |
| 75.0                   | 190.5                            | 4.52         | 4.48 | 4.44 | 4.39 | 4.35 | 4.31 | 4.26 | 4.22 | 4.18 | 4.13 | 4.09 | 4.05 | 4.00 | 3.96 | 3.92 | 3.87 | 3.83 |
| 75.5                   | 191.8                            | 4.59         | 4.55 | 4.51 | 4.46 | 4.42 | 4.38 | 4.34 | 4.29 | 4.25 | 4.21 | 4.16 | 4.12 | 4.08 | 4.03 | 3.99 | 3.95 | 3.90 |
| 76.0                   | 193.0                            | 4.66         | 4.62 | 4.58 | 4.53 | 4.49 | 4.45 | 4.40 | 4.36 | 4.32 | 4.27 | 4.23 | 4.19 | 4.14 | 4.10 | 4.06 | 4.01 | 3.97 |
| 76.5                   | 194.3                            | 4.73         | 4.69 | 4.65 | 4.61 | 4.56 | 4.52 | 4.48 | 4.43 | 4.39 | 4.35 | 4.30 | 4.26 | 4.22 | 4.17 | 4.13 | 4.09 | 4.04 |
| 77.0                   | 195.6                            | 4.81         | 4.76 | 4.72 | 4.68 | 4.63 | 4.59 | 4.55 | 4.51 | 4.46 | 4.42 | 4.38 | 4.33 | 4.29 | 4.25 | 4.20 | 4.16 | 4.12 |
| 77.5                   | 196.9                            | 4.88         | 4.84 | 4.79 | 4.75 | 4.71 | 4.66 | 4.62 | 4.58 | 4.54 | 4.49 | 4.45 | 4.41 | 4.36 | 4.32 | 4.28 | 4.23 | 4.19 |
| 78.0                   | 198.1                            | 4.95         | 4.90 | 4.86 | 4.82 | 4.77 | 4.73 | 4.69 | 4.65 | 4.60 | 4.56 | 4.52 | 4.47 | 4.43 | 4.39 | 4.34 | 4.30 | 4.26 |
| 78.5                   | 199.4                            | 5.02         | 4.98 | 4.93 | 4.89 | 4.85 | 4.80 | 4.76 | 4.72 | 4.68 | 4.63 | 4.59 | 4.55 | 4.50 | 4.46 | 4.42 | 4.37 | 4.33 |
| 79.0                   | 200.7                            | 5.09         | 5.05 | 5.01 | 4.96 | 4.92 | 4.88 | 4.83 | 4.79 | 4.75 | 4.70 | 4.66 | 4.62 | 4.58 | 4.53 | 4.49 | 4.45 | 4.40 |
| 79.5                   | 201.9                            | 5.16         | 5.12 | 5.07 | 5.03 | 4.99 | 4.94 | 4.90 | 4.86 | 4.82 | 4.77 | 4.73 | 4.69 | 4.64 | 4.60 | 4.56 | 4.51 | 4.47 |
| 80.0                   | 203.2                            | 5.23         | 5.19 | 5.15 | 5.10 | 5.06 | 5.02 | 4.97 | 4.93 | 4.89 | 4.85 | 4.80 | 4.76 | 4.72 | 4.67 | 4.63 | 4.59 | 4.54 |
| 80.5                   | 204.5                            | 5.31         | 5.26 | 5.22 | 5.18 | 5.13 | 5.09 | 5.05 | 5.00 | 4.96 | 4.92 | 4.87 | 4.83 | 4.79 | 4.75 | 4.70 | 4.66 | 4.62 |
| 81.0                   | 205.7                            | 5.37         | 5.33 | 5.29 | 5.24 | 5.20 | 5.16 | 5.11 | 5.07 | 5.03 | 4.99 | 4.94 | 4.90 | 4.86 | 4.81 | 4.77 | 4.73 | 4.68 |
| 81.5                   | 207.0                            | 5.45         | 5.40 | 5.36 | 5.32 | 5.27 | 5.23 | 5.19 | 5.14 | 5.10 | 5.06 | 5.01 | 4.97 | 4.93 | 4.89 | 4.84 | 4.80 | 4.76 |
| 82.0                   | 208.3                            | 5.52         | 5.48 | 5.43 | 5.39 | 5.35 | 5.30 | 5.26 | 5.22 | 5.17 | 5.13 | 5.09 | 5.04 | 5.00 | 4.96 | 4.92 | 4.87 | 4.83 |
| 82.5                   | 209.6                            | 5.59         | 5.55 | 5.51 | 5.46 | 5.42 | 5.38 | 5.33 | 5.29 | 5.25 | 5.20 | 5.16 | 5.12 | 5.07 | 5.03 | 4.99 | 4.94 | 4.90 |

TABLE 7A.—NAVAJO MALES FEV-1 LOWER LIMIT OF NORMAL VALUES, CRAPO, ET AL. (1988)

[Reference value equation:  $[-4.7504 + (-0.0283)(\text{age}) + (0.0558)(\text{height})] \times (0.812)$ ]

| Height in inches | Height in centimeters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------|-----------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                  |                       | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0             | 154.9                 | 2.04         | 1.99 | 1.94 | 1.90 | 1.85 | 1.81 | 1.76 | 1.71 | 1.67 | 1.62 | 1.58 | 1.53 | 1.48 | 1.44 | 1.39 | 1.35 | 1.30 |
| 61.5             | 156.2                 | 2.09         | 2.05 | 2.00 | 1.96 | 1.91 | 1.86 | 1.82 | 1.77 | 1.73 | 1.68 | 1.63 | 1.59 | 1.54 | 1.50 | 1.45 | 1.40 | 1.36 |
| 62.0             | 157.5                 | 2.15         | 2.11 | 2.06 | 2.02 | 1.97 | 1.92 | 1.88 | 1.83 | 1.79 | 1.74 | 1.69 | 1.65 | 1.60 | 1.56 | 1.51 | 1.46 | 1.42 |
| 62.5             | 158.8                 | 2.21         | 2.17 | 2.12 | 2.07 | 2.03 | 1.98 | 1.94 | 1.89 | 1.84 | 1.80 | 1.75 | 1.71 | 1.66 | 1.61 | 1.57 | 1.52 | 1.48 |
| 63.0             | 160.0                 | 2.27         | 2.22 | 2.17 | 2.13 | 2.08 | 2.04 | 1.99 | 1.94 | 1.90 | 1.85 | 1.81 | 1.76 | 1.71 | 1.67 | 1.62 | 1.58 | 1.53 |
| 63.5             | 161.3                 | 2.33         | 2.28 | 2.23 | 2.19 | 2.14 | 2.10 | 2.05 | 2.00 | 1.96 | 1.91 | 1.87 | 1.82 | 1.77 | 1.73 | 1.68 | 1.64 | 1.59 |
| 64.0             | 162.6                 | 2.38         | 2.34 | 2.29 | 2.25 | 2.20 | 2.15 | 2.11 | 2.06 | 2.02 | 1.97 | 1.92 | 1.88 | 1.83 | 1.79 | 1.74 | 1.69 | 1.65 |
| 64.5             | 163.8                 | 2.44         | 2.39 | 2.35 | 2.30 | 2.25 | 2.21 | 2.16 | 2.12 | 2.07 | 2.02 | 1.98 | 1.93 | 1.89 | 1.84 | 1.79 | 1.75 | 1.70 |
| 65.0             | 165.1                 | 2.50         | 2.45 | 2.41 | 2.36 | 2.31 | 2.27 | 2.22 | 2.18 | 2.13 | 2.08 | 2.04 | 1.99 | 1.95 | 1.90 | 1.85 | 1.81 | 1.76 |
| 65.5             | 166.4                 | 2.55         | 2.51 | 2.46 | 2.42 | 2.37 | 2.33 | 2.28 | 2.23 | 2.19 | 2.14 | 2.10 | 2.05 | 2.00 | 1.96 | 1.91 | 1.87 | 1.82 |
| 66.0             | 167.6                 | 2.61         | 2.57 | 2.52 | 2.47 | 2.43 | 2.38 | 2.34 | 2.29 | 2.24 | 2.20 | 2.15 | 2.11 | 2.06 | 2.01 | 1.97 | 1.92 | 1.88 |
| 66.5             | 168.9                 | 2.67         | 2.62 | 2.58 | 2.53 | 2.49 | 2.44 | 2.39 | 2.35 | 2.30 | 2.26 | 2.21 | 2.16 | 2.12 | 2.07 | 2.03 | 1.98 | 1.93 |
| 67.0             | 170.2                 | 2.73         | 2.68 | 2.64 | 2.59 | 2.54 | 2.50 | 2.45 | 2.41 | 2.36 | 2.31 | 2.27 | 2.22 | 2.18 | 2.13 | 2.08 | 2.04 | 1.99 |
| 67.5             | 171.5                 | 2.79         | 2.74 | 2.70 | 2.65 | 2.60 | 2.56 | 2.51 | 2.47 | 2.42 | 2.37 | 2.33 | 2.28 | 2.24 | 2.19 | 2.14 | 2.10 | 2.05 |
| 68.0             | 172.7                 | 2.84         | 2.80 | 2.75 | 2.70 | 2.66 | 2.61 | 2.57 | 2.52 | 2.47 | 2.43 | 2.38 | 2.34 | 2.29 | 2.24 | 2.20 | 2.15 | 2.11 |
| 68.5             | 174.0                 | 2.90         | 2.85 | 2.81 | 2.76 | 2.72 | 2.67 | 2.62 | 2.58 | 2.53 | 2.49 | 2.44 | 2.39 | 2.35 | 2.30 | 2.26 | 2.21 | 2.17 |
| 69.0             | 175.3                 | 2.96         | 2.91 | 2.87 | 2.82 | 2.78 | 2.73 | 2.68 | 2.64 | 2.59 | 2.55 | 2.50 | 2.45 | 2.41 | 2.36 | 2.32 | 2.27 | 2.22 |
| 69.5             | 176.5                 | 3.01         | 2.97 | 2.92 | 2.88 | 2.83 | 2.78 | 2.74 | 2.69 | 2.65 | 2.60 | 2.55 | 2.51 | 2.46 | 2.42 | 2.37 | 2.32 | 2.28 |
| 70.0             | 177.8                 | 3.07         | 3.03 | 2.98 | 2.93 | 2.89 | 2.84 | 2.80 | 2.75 | 2.71 | 2.66 | 2.61 | 2.57 | 2.52 | 2.48 | 2.43 | 2.38 | 2.34 |
| 70.5             | 179.1                 | 3.13         | 3.09 | 3.04 | 2.99 | 2.95 | 2.90 | 2.86 | 2.81 | 2.76 | 2.72 | 2.67 | 2.63 | 2.58 | 2.53 | 2.49 | 2.44 | 2.40 |
| 71.0             | 180.3                 | 3.19         | 3.14 | 3.09 | 3.05 | 3.00 | 2.96 | 2.91 | 2.86 | 2.82 | 2.77 | 2.73 | 2.68 | 2.63 | 2.59 | 2.54 | 2.50 | 2.45 |
| 71.5             | 181.6                 | 3.24         | 3.20 | 3.15 | 3.11 | 3.06 | 3.02 | 2.97 | 2.92 | 2.88 | 2.83 | 2.79 | 2.74 | 2.69 | 2.65 | 2.60 | 2.56 | 2.51 |
| 72.0             | 182.9                 | 3.30         | 3.26 | 3.21 | 3.17 | 3.12 | 3.07 | 3.03 | 2.98 | 2.94 | 2.89 | 2.84 | 2.80 | 2.75 | 2.71 | 2.66 | 2.61 | 2.57 |
| 72.5             | 184.2                 | 3.36         | 3.32 | 3.27 | 3.22 | 3.18 | 3.13 | 3.09 | 3.04 | 3.00 | 2.95 | 2.90 | 2.86 | 2.81 | 2.77 | 2.72 | 2.67 | 2.63 |
| 73.0             | 185.4                 | 3.42         | 3.37 | 3.33 | 3.28 | 3.23 | 3.19 | 3.14 | 3.10 | 3.05 | 3.00 | 2.96 | 2.91 | 2.87 | 2.82 | 2.77 | 2.73 | 2.68 |
| 73.5             | 186.7                 | 3.48         | 3.43 | 3.38 | 3.34 | 3.29 | 3.25 | 3.20 | 3.15 | 3.11 | 3.06 | 3.02 | 2.97 | 2.92 | 2.88 | 2.83 | 2.79 | 2.74 |
| 74.0             | 188.0                 | 3.53         | 3.49 | 3.44 | 3.40 | 3.35 | 3.31 | 3.26 | 3.21 | 3.17 | 3.12 | 3.08 | 3.03 | 2.98 | 2.94 | 2.89 | 2.85 | 2.80 |
| 74.5             | 189.2                 | 3.59         | 3.54 | 3.50 | 3.45 | 3.41 | 3.36 | 3.31 | 3.27 | 3.22 | 3.18 | 3.13 | 3.08 | 3.04 | 2.99 | 2.95 | 2.90 | 2.85 |
| 75.0             | 190.5                 | 3.65         | 3.60 | 3.56 | 3.51 | 3.46 | 3.42 | 3.37 | 3.33 | 3.28 | 3.23 | 3.19 | 3.14 | 3.10 | 3.05 | 3.00 | 2.96 | 2.91 |
| 75.5             | 191.8                 | 3.71         | 3.66 | 3.62 | 3.57 | 3.52 | 3.48 | 3.43 | 3.39 | 3.34 | 3.29 | 3.25 | 3.20 | 3.16 | 3.11 | 3.06 | 3.02 | 2.97 |
| 76.0             | 193.0                 | 3.76         | 3.72 | 3.67 | 3.62 | 3.58 | 3.53 | 3.49 | 3.44 | 3.39 | 3.35 | 3.30 | 3.26 | 3.21 | 3.16 | 3.12 | 3.07 | 3.03 |
| 76.5             | 194.3                 | 3.82         | 3.77 | 3.73 | 3.68 | 3.64 | 3.59 | 3.54 | 3.50 | 3.45 | 3.41 | 3.36 | 3.31 | 3.27 | 3.22 | 3.18 | 3.13 | 3.08 |
| 77.0             | 195.6                 | 3.88         | 3.83 | 3.79 | 3.74 | 3.70 | 3.65 | 3.60 | 3.56 | 3.51 | 3.47 | 3.42 | 3.37 | 3.33 | 3.28 | 3.24 | 3.19 | 3.14 |
| 77.5             | 196.9                 | 3.94         | 3.89 | 3.85 | 3.80 | 3.75 | 3.71 | 3.66 | 3.62 | 3.57 | 3.52 | 3.48 | 3.43 | 3.39 | 3.34 | 3.29 | 3.25 | 3.20 |
| 78.0             | 198.1                 | 3.99         | 3.95 | 3.90 | 3.85 | 3.81 | 3.76 | 3.72 | 3.67 | 3.62 | 3.58 | 3.53 | 3.49 | 3.44 | 3.40 | 3.35 | 3.30 | 3.26 |
| 78.5             | 199.4                 | 4.05         | 4.01 | 3.96 | 3.91 | 3.87 | 3.82 | 3.78 | 3.73 | 3.68 | 3.64 | 3.59 | 3.55 | 3.50 | 3.45 | 3.41 | 3.36 | 3.32 |
| 79.0             | 200.7                 | 4.11         | 4.06 | 4.02 | 3.97 | 3.93 | 3.88 | 3.83 | 3.79 | 3.74 | 3.70 | 3.65 | 3.60 | 3.56 | 3.51 | 3.47 | 3.42 | 3.37 |
| 79.5             | 201.9                 | 4.16         | 4.12 | 4.07 | 4.03 | 3.98 | 3.93 | 3.89 | 3.84 | 3.80 | 3.75 | 3.71 | 3.66 | 3.61 | 3.57 | 3.52 | 3.48 | 3.43 |
| 80.0             | 203.2                 | 4.22         | 4.18 | 4.13 | 4.09 | 4.04 | 3.99 | 3.95 | 3.90 | 3.86 | 3.81 | 3.76 | 3.72 | 3.67 | 3.63 | 3.58 | 3.53 | 3.49 |
| 80.5             | 204.5                 | 4.28         | 4.24 | 4.19 | 4.14 | 4.10 | 4.05 | 4.01 | 3.96 | 3.91 | 3.87 | 3.82 | 3.78 | 3.73 | 3.69 | 3.64 | 3.59 | 3.55 |
| 81.0             | 205.7                 | 4.34         | 4.29 | 4.24 | 4.20 | 4.15 | 4.11 | 4.06 | 4.02 | 3.97 | 3.92 | 3.88 | 3.83 | 3.79 | 3.74 | 3.69 | 3.65 | 3.60 |
| 81.5             | 207.0                 | 4.40         | 4.35 | 4.30 | 4.26 | 4.21 | 4.17 | 4.12 | 4.07 | 4.03 | 3.98 | 3.94 | 3.89 | 3.84 | 3.80 | 3.75 | 3.71 | 3.66 |
| 82.0             | 208.3                 | 4.45         | 4.41 | 4.36 | 4.32 | 4.27 | 4.22 | 4.18 | 4.13 | 4.09 | 4.04 | 4.00 | 3.95 | 3.90 | 3.86 | 3.81 | 3.77 | 3.72 |
| 82.5             | 209.6                 | 4.51         | 4.47 | 4.42 | 4.38 | 4.33 | 4.28 | 4.24 | 4.19 | 4.15 | 4.10 | 4.05 | 4.01 | 3.96 | 3.92 | 3.87 | 3.82 | 3.78 |

TABLE 8.—NAVAJO FEMALES FVC LOWER LIMIT OF NORMAL VALUES, CRAPO, ET AL. (1988)

[Reference value equation:  $[-2.9769 + (-0.0207)(\text{age}) + (0.0448)(\text{height})] \times (0.815)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 2.40         | 2.37 | 2.34 | 2.30 | 2.27 | 2.23 | 2.20 | 2.17 | 2.13 | 2.10 | 2.07 | 2.03 | 2.00 | 1.96 | 1.93 | 1.90 | 1.86 |
| 61.5                   | 156.2                            | 2.45         | 2.42 | 2.38 | 2.35 | 2.32 | 2.28 | 2.25 | 2.21 | 2.18 | 2.15 | 2.11 | 2.08 | 2.05 | 2.01 | 1.98 | 1.94 | 1.91 |
| 62.0                   | 157.5                            | 2.50         | 2.46 | 2.43 | 2.40 | 2.36 | 2.33 | 2.30 | 2.26 | 2.23 | 2.19 | 2.16 | 2.13 | 2.09 | 2.06 | 2.03 | 1.99 | 1.96 |
| 62.5                   | 158.8                            | 2.55         | 2.51 | 2.48 | 2.44 | 2.41 | 2.38 | 2.34 | 2.31 | 2.28 | 2.24 | 2.21 | 2.17 | 2.14 | 2.11 | 2.07 | 2.04 | 2.01 |
| 63.0                   | 160.0                            | 2.59         | 2.56 | 2.52 | 2.49 | 2.45 | 2.42 | 2.39 | 2.35 | 2.32 | 2.29 | 2.25 | 2.22 | 2.18 | 2.15 | 2.12 | 2.08 | 2.05 |
| 63.5                   | 161.3                            | 2.64         | 2.60 | 2.57 | 2.54 | 2.50 | 2.47 | 2.43 | 2.40 | 2.37 | 2.33 | 2.30 | 2.27 | 2.23 | 2.20 | 2.16 | 2.13 | 2.10 |
| 64.0                   | 162.6                            | 2.68         | 2.65 | 2.62 | 2.58 | 2.55 | 2.52 | 2.48 | 2.45 | 2.41 | 2.38 | 2.35 | 2.31 | 2.28 | 2.25 | 2.21 | 2.18 | 2.14 |
| 64.5                   | 163.8                            | 2.73         | 2.69 | 2.66 | 2.63 | 2.59 | 2.56 | 2.53 | 2.49 | 2.46 | 2.42 | 2.39 | 2.36 | 2.32 | 2.29 | 2.26 | 2.22 | 2.19 |
| 65.0                   | 165.1                            | 2.78         | 2.74 | 2.71 | 2.67 | 2.64 | 2.61 | 2.57 | 2.54 | 2.51 | 2.47 | 2.44 | 2.40 | 2.37 | 2.34 | 2.30 | 2.27 | 2.24 |
| 65.5                   | 166.4                            | 2.82         | 2.79 | 2.75 | 2.72 | 2.69 | 2.65 | 2.62 | 2.59 | 2.55 | 2.52 | 2.48 | 2.45 | 2.42 | 2.38 | 2.35 | 2.32 | 2.28 |
| 66.0                   | 167.6                            | 2.87         | 2.83 | 2.80 | 2.77 | 2.73 | 2.70 | 2.67 | 2.63 | 2.60 | 2.56 | 2.53 | 2.50 | 2.46 | 2.43 | 2.40 | 2.36 | 2.33 |
| 66.5                   | 168.9                            | 2.91         | 2.88 | 2.85 | 2.81 | 2.78 | 2.75 | 2.71 | 2.68 | 2.64 | 2.61 | 2.58 | 2.54 | 2.51 | 2.48 | 2.44 | 2.41 | 2.37 |
| 67.0                   | 170.2                            | 2.96         | 2.93 | 2.89 | 2.86 | 2.83 | 2.79 | 2.76 | 2.73 | 2.69 | 2.66 | 2.62 | 2.59 | 2.56 | 2.52 | 2.49 | 2.46 | 2.42 |
| 67.5                   | 171.5                            | 3.01         | 2.98 | 2.94 | 2.91 | 2.87 | 2.84 | 2.81 | 2.77 | 2.74 | 2.71 | 2.67 | 2.64 | 2.60 | 2.57 | 2.54 | 2.50 | 2.47 |
| 68.0                   | 172.7                            | 3.05         | 3.02 | 2.99 | 2.95 | 2.92 | 2.88 | 2.85 | 2.82 | 2.78 | 2.75 | 2.72 | 2.68 | 2.65 | 2.61 | 2.58 | 2.55 | 2.51 |
| 68.5                   | 174.0                            | 3.10         | 3.07 | 3.03 | 3.00 | 2.97 | 2.93 | 2.90 | 2.86 | 2.83 | 2.80 | 2.76 | 2.73 | 2.70 | 2.66 | 2.63 | 2.59 | 2.56 |
| 69.0                   | 175.3                            | 3.15         | 3.11 | 3.08 | 3.05 | 3.01 | 2.98 | 2.95 | 2.91 | 2.88 | 2.84 | 2.81 | 2.78 | 2.74 | 2.71 | 2.68 | 2.64 | 2.61 |
| 69.5                   | 176.5                            | 3.19         | 3.16 | 3.12 | 3.09 | 3.06 | 3.02 | 2.99 | 2.96 | 2.92 | 2.89 | 2.85 | 2.82 | 2.79 | 2.75 | 2.72 | 2.69 | 2.65 |
| 70.0                   | 177.8                            | 3.24         | 3.21 | 3.17 | 3.14 | 3.10 | 3.07 | 3.04 | 3.00 | 2.97 | 2.94 | 2.90 | 2.87 | 2.83 | 2.80 | 2.77 | 2.73 | 2.70 |
| 70.5                   | 179.1                            | 3.29         | 3.25 | 3.22 | 3.19 | 3.15 | 3.12 | 3.08 | 3.05 | 3.02 | 2.98 | 2.95 | 2.92 | 2.88 | 2.85 | 2.81 | 2.78 | 2.75 |
| 71.0                   | 180.3                            | 3.33         | 3.30 | 3.26 | 3.23 | 3.20 | 3.16 | 3.13 | 3.09 | 3.06 | 3.03 | 2.99 | 2.96 | 2.93 | 2.89 | 2.86 | 2.82 | 2.79 |
| 71.5                   | 181.6                            | 3.38         | 3.34 | 3.31 | 3.28 | 3.24 | 3.21 | 3.18 | 3.14 | 3.11 | 3.07 | 3.04 | 3.01 | 2.97 | 2.94 | 2.91 | 2.87 | 2.84 |
| 72.0                   | 182.9                            | 3.43         | 3.39 | 3.36 | 3.32 | 3.29 | 3.26 | 3.22 | 3.19 | 3.16 | 3.12 | 3.09 | 3.05 | 3.02 | 2.99 | 2.95 | 2.92 | 2.88 |

TABLE 8.—NAVAJO FEMALES FVC LOWER LIMIT OF NORMAL VALUES, CRAPO, ET AL. (1988)—Continued  
 [Reference value equation:  $[-2.9769 + (-0.0207)(\text{age}) + (0.0448)(\text{height})] \times (0.815)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 72.5                   | 184.2                            | 3.47         | 3.44 | 3.41 | 3.37 | 3.34 | 3.30 | 3.27 | 3.24 | 3.20 | 3.17 | 3.14 | 3.10 | 3.07 | 3.03 | 3.00 | 2.97 | 2.93 |
| 73.0                   | 185.4                            | 3.52         | 3.48 | 3.45 | 3.42 | 3.38 | 3.35 | 3.31 | 3.28 | 3.25 | 3.21 | 3.18 | 3.15 | 3.11 | 3.08 | 3.04 | 3.01 | 2.98 |
| 73.5                   | 186.7                            | 3.56         | 3.53 | 3.50 | 3.46 | 3.43 | 3.40 | 3.36 | 3.33 | 3.29 | 3.26 | 3.23 | 3.19 | 3.16 | 3.13 | 3.09 | 3.06 | 3.02 |
| 74.0                   | 188.0                            | 3.61         | 3.58 | 3.54 | 3.51 | 3.48 | 3.44 | 3.41 | 3.38 | 3.34 | 3.31 | 3.27 | 3.24 | 3.21 | 3.17 | 3.14 | 3.11 | 3.07 |
| 74.5                   | 189.2                            | 3.66         | 3.62 | 3.59 | 3.55 | 3.52 | 3.49 | 3.45 | 3.42 | 3.39 | 3.35 | 3.32 | 3.28 | 3.25 | 3.22 | 3.18 | 3.15 | 3.12 |
| 75.0                   | 190.5                            | 3.70         | 3.67 | 3.64 | 3.60 | 3.57 | 3.53 | 3.50 | 3.47 | 3.43 | 3.40 | 3.37 | 3.33 | 3.30 | 3.26 | 3.23 | 3.20 | 3.16 |
| 75.5                   | 191.8                            | 3.75         | 3.72 | 3.68 | 3.65 | 3.62 | 3.58 | 3.55 | 3.51 | 3.48 | 3.45 | 3.41 | 3.38 | 3.35 | 3.31 | 3.28 | 3.24 | 3.21 |
| 76.0                   | 193.0                            | 3.79         | 3.76 | 3.73 | 3.69 | 3.66 | 3.63 | 3.59 | 3.56 | 3.52 | 3.49 | 3.46 | 3.42 | 3.39 | 3.36 | 3.32 | 3.29 | 3.25 |
| 76.5                   | 194.3                            | 3.84         | 3.81 | 3.77 | 3.74 | 3.71 | 3.67 | 3.64 | 3.61 | 3.57 | 3.54 | 3.50 | 3.47 | 3.44 | 3.40 | 3.37 | 3.34 | 3.30 |
| 77.0                   | 195.6                            | 3.89         | 3.86 | 3.82 | 3.79 | 3.75 | 3.72 | 3.69 | 3.65 | 3.62 | 3.59 | 3.55 | 3.52 | 3.48 | 3.45 | 3.42 | 3.38 | 3.35 |
| 77.5                   | 196.9                            | 3.94         | 3.90 | 3.87 | 3.84 | 3.80 | 3.77 | 3.73 | 3.70 | 3.67 | 3.63 | 3.60 | 3.57 | 3.53 | 3.50 | 3.46 | 3.43 | 3.40 |
| 78.0                   | 198.1                            | 3.98         | 3.95 | 3.91 | 3.88 | 3.85 | 3.81 | 3.78 | 3.74 | 3.71 | 3.68 | 3.64 | 3.61 | 3.58 | 3.54 | 3.51 | 3.47 | 3.44 |
| 78.5                   | 199.4                            | 4.03         | 3.99 | 3.96 | 3.93 | 3.89 | 3.86 | 3.83 | 3.79 | 3.76 | 3.72 | 3.69 | 3.66 | 3.62 | 3.59 | 3.56 | 3.52 | 3.49 |
| 79.0                   | 200.7                            | 4.08         | 4.04 | 4.01 | 3.97 | 3.94 | 3.91 | 3.87 | 3.84 | 3.81 | 3.77 | 3.74 | 3.70 | 3.67 | 3.64 | 3.60 | 3.57 | 3.54 |
| 79.5                   | 201.9                            | 4.12         | 4.09 | 4.05 | 4.02 | 3.98 | 3.95 | 3.92 | 3.88 | 3.85 | 3.82 | 3.78 | 3.75 | 3.71 | 3.68 | 3.65 | 3.61 | 3.58 |
| 80.0                   | 203.2                            | 4.17         | 4.13 | 4.10 | 4.07 | 4.03 | 4.00 | 3.96 | 3.93 | 3.90 | 3.86 | 3.83 | 3.80 | 3.76 | 3.73 | 3.69 | 3.66 | 3.63 |
| 80.5                   | 204.5                            | 4.21         | 4.18 | 4.15 | 4.11 | 4.08 | 4.05 | 4.01 | 3.98 | 3.94 | 3.91 | 3.88 | 3.84 | 3.81 | 3.78 | 3.74 | 3.71 | 3.67 |
| 81.0                   | 205.7                            | 4.26         | 4.22 | 4.19 | 4.16 | 4.12 | 4.09 | 4.06 | 4.02 | 3.99 | 3.95 | 3.92 | 3.89 | 3.85 | 3.82 | 3.79 | 3.75 | 3.72 |
| 81.5                   | 207.0                            | 4.31         | 4.27 | 4.24 | 4.20 | 4.17 | 4.14 | 4.10 | 4.07 | 4.04 | 4.00 | 3.97 | 3.93 | 3.90 | 3.87 | 3.83 | 3.80 | 3.77 |
| 82.0                   | 208.3                            | 4.35         | 4.32 | 4.29 | 4.25 | 4.22 | 4.18 | 4.15 | 4.12 | 4.08 | 4.05 | 4.02 | 3.98 | 3.95 | 3.91 | 3.88 | 3.85 | 3.81 |
| 82.5                   | 209.6                            | 4.40         | 4.37 | 4.33 | 4.30 | 4.27 | 4.23 | 4.20 | 4.16 | 4.13 | 4.10 | 4.06 | 4.03 | 4.00 | 3.96 | 3.93 | 3.89 | 3.86 |

TABLE 8A.—NAVAJO FEMALES FEV-1 LOWER LIMIT OF NORMAL VALUES, CRAPO, ET AL. (1988)  
 [Reference value equation:  $[-1.8110 + (-0.0233)(\text{age}) + (0.0347)(\text{height})] \times (0.808)$ ]

| Height<br>in<br>inches | Height<br>in<br>centi-<br>meters | Age in years |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|----------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        |                                  | 49           | 51   | 53   | 55   | 57   | 59   | 61   | 63   | 65   | 67   | 69   | 71   | 73   | 75   | 77   | 79   | 81   |
| 61.0                   | 154.9                            | 1.96         | 1.92 | 1.88 | 1.84 | 1.81 | 1.77 | 1.73 | 1.69 | 1.66 | 1.62 | 1.58 | 1.54 | 1.51 | 1.47 | 1.43 | 1.39 | 1.35 |
| 61.5                   | 156.2                            | 1.99         | 1.96 | 1.92 | 1.88 | 1.84 | 1.81 | 1.77 | 1.73 | 1.69 | 1.65 | 1.62 | 1.58 | 1.54 | 1.50 | 1.47 | 1.43 | 1.39 |
| 62.0                   | 157.5                            | 2.03         | 1.99 | 1.95 | 1.92 | 1.88 | 1.84 | 1.80 | 1.77 | 1.73 | 1.69 | 1.65 | 1.62 | 1.58 | 1.54 | 1.50 | 1.47 | 1.43 |
| 62.5                   | 158.8                            | 2.07         | 2.03 | 1.99 | 1.95 | 1.92 | 1.88 | 1.84 | 1.80 | 1.77 | 1.73 | 1.69 | 1.65 | 1.61 | 1.58 | 1.54 | 1.50 | 1.46 |
| 63.0                   | 160.0                            | 2.10         | 2.06 | 2.02 | 1.99 | 1.95 | 1.91 | 1.87 | 1.84 | 1.80 | 1.76 | 1.72 | 1.69 | 1.65 | 1.61 | 1.57 | 1.54 | 1.50 |
| 63.5                   | 161.3                            | 2.14         | 2.10 | 2.06 | 2.02 | 1.99 | 1.95 | 1.91 | 1.87 | 1.84 | 1.80 | 1.76 | 1.72 | 1.68 | 1.65 | 1.61 | 1.57 | 1.53 |
| 64.0                   | 162.6                            | 2.17         | 2.14 | 2.10 | 2.06 | 2.02 | 1.98 | 1.95 | 1.91 | 1.87 | 1.83 | 1.80 | 1.76 | 1.72 | 1.68 | 1.65 | 1.61 | 1.57 |
| 64.5                   | 163.8                            | 2.21         | 2.17 | 2.13 | 2.09 | 2.06 | 2.02 | 1.98 | 1.94 | 1.91 | 1.87 | 1.83 | 1.79 | 1.75 | 1.72 | 1.68 | 1.64 | 1.60 |
| 65.0                   | 165.1                            | 2.24         | 2.21 | 2.17 | 2.13 | 2.09 | 2.05 | 2.02 | 1.98 | 1.94 | 1.90 | 1.87 | 1.83 | 1.79 | 1.75 | 1.72 | 1.68 | 1.64 |
| 65.5                   | 166.4                            | 2.28         | 2.24 | 2.20 | 2.17 | 2.13 | 2.09 | 2.05 | 2.02 | 1.98 | 1.94 | 1.90 | 1.86 | 1.83 | 1.79 | 1.75 | 1.71 | 1.68 |
| 66.0                   | 167.6                            | 2.31         | 2.28 | 2.24 | 2.20 | 2.16 | 2.13 | 2.09 | 2.05 | 2.01 | 1.98 | 1.94 | 1.90 | 1.86 | 1.82 | 1.79 | 1.75 | 1.71 |
| 66.5                   | 168.9                            | 2.35         | 2.31 | 2.27 | 2.24 | 2.20 | 2.16 | 2.12 | 2.09 | 2.05 | 2.01 | 1.97 | 1.94 | 1.90 | 1.86 | 1.82 | 1.79 | 1.75 |
| 67.0                   | 170.2                            | 2.39         | 2.35 | 2.31 | 2.27 | 2.24 | 2.20 | 2.16 | 2.12 | 2.08 | 2.05 | 2.01 | 1.97 | 1.93 | 1.90 | 1.86 | 1.82 | 1.78 |
| 67.5                   | 171.5                            | 2.42         | 2.39 | 2.35 | 2.31 | 2.27 | 2.23 | 2.20 | 2.16 | 2.12 | 2.08 | 2.05 | 2.01 | 1.97 | 1.93 | 1.90 | 1.86 | 1.82 |
| 68.0                   | 172.7                            | 2.46         | 2.42 | 2.38 | 2.34 | 2.31 | 2.27 | 2.23 | 2.19 | 2.16 | 2.12 | 2.08 | 2.04 | 2.00 | 1.97 | 1.93 | 1.89 | 1.85 |
| 68.5                   | 174.0                            | 2.49         | 2.46 | 2.42 | 2.38 | 2.34 | 2.30 | 2.27 | 2.23 | 2.19 | 2.15 | 2.12 | 2.08 | 2.04 | 2.00 | 1.97 | 1.93 | 1.89 |
| 69.0                   | 175.3                            | 2.53         | 2.49 | 2.45 | 2.42 | 2.38 | 2.34 | 2.30 | 2.27 | 2.23 | 2.19 | 2.15 | 2.12 | 2.08 | 2.04 | 2.00 | 1.96 | 1.93 |
| 69.5                   | 176.5                            | 2.56         | 2.53 | 2.49 | 2.45 | 2.41 | 2.37 | 2.34 | 2.30 | 2.26 | 2.22 | 2.19 | 2.15 | 2.11 | 2.07 | 2.04 | 2.00 | 1.96 |
| 70.0                   | 177.8                            | 2.60         | 2.56 | 2.52 | 2.49 | 2.45 | 2.41 | 2.37 | 2.34 | 2.30 | 2.26 | 2.22 | 2.19 | 2.15 | 2.11 | 2.07 | 2.03 | 2.00 |
| 70.5                   | 179.1                            | 2.64         | 2.60 | 2.56 | 2.52 | 2.49 | 2.45 | 2.41 | 2.37 | 2.33 | 2.30 | 2.26 | 2.22 | 2.18 | 2.15 | 2.11 | 2.07 | 2.03 |
| 71.0                   | 180.3                            | 2.67         | 2.63 | 2.59 | 2.56 | 2.52 | 2.48 | 2.44 | 2.41 | 2.37 | 2.33 | 2.29 | 2.26 | 2.22 | 2.18 | 2.14 | 2.10 | 2.07 |
| 71.5                   | 181.6                            | 2.71         | 2.67 | 2.63 | 2.59 | 2.56 | 2.52 | 2.48 | 2.44 | 2.40 | 2.37 | 2.33 | 2.29 | 2.25 | 2.22 | 2.18 | 2.14 | 2.10 |
| 72.0                   | 182.9                            | 2.74         | 2.70 | 2.67 | 2.63 | 2.59 | 2.55 | 2.52 | 2.48 | 2.44 | 2.40 | 2.37 | 2.33 | 2.29 | 2.25 | 2.22 | 2.18 | 2.14 |
| 72.5                   | 184.2                            | 2.78         | 2.74 | 2.70 | 2.67 | 2.63 | 2.59 | 2.55 | 2.52 | 2.48 | 2.44 | 2.40 | 2.36 | 2.33 | 2.29 | 2.25 | 2.21 | 2.18 |
| 73.0                   | 185.4                            | 2.81         | 2.77 | 2.74 | 2.70 | 2.66 | 2.62 | 2.59 | 2.55 | 2.51 | 2.47 | 2.44 | 2.40 | 2.36 | 2.32 | 2.29 | 2.25 | 2.21 |
| 73.5                   | 186.7                            | 2.85         | 2.81 | 2.77 | 2.74 | 2.70 | 2.66 | 2.62 | 2.59 | 2.55 | 2.51 | 2.47 | 2.43 | 2.40 | 2.36 | 2.32 | 2.28 | 2.25 |
| 74.0                   | 188.0                            | 2.89         | 2.85 | 2.81 | 2.77 | 2.73 | 2.70 | 2.66 | 2.62 | 2.58 | 2.55 | 2.51 | 2.47 | 2.43 | 2.40 | 2.36 | 2.32 | 2.28 |
| 74.5                   | 189.2                            | 2.92         | 2.88 | 2.84 | 2.81 | 2.77 | 2.73 | 2.69 | 2.66 | 2.62 | 2.58 | 2.54 | 2.50 | 2.47 | 2.43 | 2.39 | 2.35 | 2.32 |
| 75.0                   | 190.5                            | 2.96         | 2.92 | 2.88 | 2.84 | 2.80 | 2.77 | 2.73 | 2.69 | 2.65 | 2.62 | 2.58 | 2.54 | 2.50 | 2.47 | 2.43 | 2.39 | 2.35 |
| 75.5                   | 191.8                            | 2.99         | 2.95 | 2.92 | 2.88 | 2.84 | 2.80 | 2.77 | 2.73 | 2.69 | 2.65 | 2.62 | 2.58 | 2.54 | 2.50 | 2.46 | 2.43 | 2.39 |
| 76.0                   | 193.0                            | 3.03         | 2.99 | 2.95 | 2.91 | 2.87 | 2.84 | 2.80 | 2.76 | 2.72 | 2.69 | 2.65 | 2.61 | 2.57 | 2.54 | 2.50 | 2.46 | 2.42 |
| 76.5                   | 194.3                            | 3.06         | 3.02 | 2.99 | 2.95 | 2.91 | 2.87 | 2.84 | 2.80 | 2.76 | 2.72 | 2.69 | 2.65 | 2.61 | 2.57 | 2.53 | 2.50 | 2.46 |
| 77.0                   | 195.6                            | 3.10         | 3.06 | 3.02 | 2.99 | 2.95 | 2.91 | 2.87 | 2.83 | 2.80 | 2.76 | 2.72 | 2.68 | 2.65 | 2.61 | 2.57 | 2.53 | 2.50 |
| 77.5                   | 196.9                            | 3.13         | 3.10 | 3.06 | 3.02 | 2.98 | 2.95 | 2.91 | 2.87 | 2.83 | 2.80 | 2.76 | 2.72 | 2.68 | 2.65 | 2.61 | 2.57 | 2.53 |
| 78.0                   | 198.1                            | 3.17         | 3.13 | 3.09 | 3.06 | 3.02 | 2.98 | 2.94 | 2.90 | 2.87 | 2.83 | 2.79 | 2.75 | 2.72 | 2.68 | 2.64 | 2.60 | 2.57 |
| 78.5                   | 199.4                            | 3.20         | 3.17 | 3.13 | 3.09 | 3.05 | 3.02 | 2.98 | 2.94 | 2.90 | 2.87 | 2.83 | 2.79 | 2.75 | 2.72 | 2.68 | 2.64 | 2.60 |
| 79.0                   | 200.7                            | 3.24         | 3.20 | 3.17 | 3.13 | 3.09 | 3.05 | 3.02 | 2.98 | 2.94 | 2.90 | 2.86 | 2.83 | 2.79 | 2.75 | 2.71 | 2.68 | 2.64 |
| 79.5                   | 201.9                            | 3.28         | 3.24 | 3.20 | 3.16 | 3.12 | 3.09 | 3.05 | 3.01 | 2.97 | 2.94 | 2.90 | 2.86 | 2.82 | 2.79 | 2.75 | 2.71 | 2.67 |
| 80.0                   | 203.2                            | 3.31         | 3.27 | 3.24 | 3.20 | 3.16 | 3.12 | 3.09 | 3.05 | 3.01 | 2.97 | 2.93 | 2.90 | 2.86 | 2.82 | 2.78 | 2.75 | 2.71 |
| 80.5                   | 204.5                            | 3.35         | 3.31 | 3.27 | 3.23 | 3.20 | 3.16 | 3.12 | 3.08 | 3.05 | 3.01 | 2.97 | 2.93 | 2.90 | 2.86 | 2.82 | 2.78 | 2.75 |
| 81.0                   | 205.7                            | 3.38         | 3.34 | 3.31 | 3.27 | 3.23 | 3.19 | 3.16 | 3.12 | 3.08 | 3.04 | 3.01 | 2.97 | 2.93 | 2.89 | 2.85 | 2.82 | 2.78 |
| 81.5                   | 207.0                            | 3.42         | 3.38 | 3.34 | 3.31 | 3.27 | 3.23 | 3.19 | 3.15 | 3.12 | 3.08 | 3.04 | 3.00 | 2.97 | 2.93 | 2.89 | 2.85 | 2.82 |
| 82.0                   | 208.3                            | 3.45         | 3.42 | 3.38 | 3.34 | 3.30 | 3.27 | 3.23 | 3.19 | 3.15 | 3.12 | 3.08 | 3.04 | 3.00 | 2.96 | 2.93 | 2.89 | 2.85 |
| 82.5                   | 209.6                            | 3.49         | 3.45 | 3.42 | 3.38 | 3.34 | 3.30 | 3.26 | 3.23 | 3.19 | 3.15 | 3.11 | 3.08 | 3.04 | 3.00 | 2.96 | 2.93 | 2.89 |

## Appendix B to Part 79—Blood-Gas Study Tables

For arterial blood-gas studies performed at test locations between sea level and 2,999 feet above sea level:

| Arterial pCO <sub>2</sub> | and arterial pO <sub>2</sub> |
|---------------------------|------------------------------|
| 25 mmHg or below .....    | 80 mmHg or below.            |
| 26 mmHg .....             | 79 mmHg or below.            |
| 27 mmHg .....             | 78 mmHg or below.            |
| 28 mmHg .....             | 77 mmHg or below.            |
| 29 mmHg .....             | 76 mmHg or below.            |
| 30 mmHg .....             | 75 mmHg or below.            |
| 31 mmHg .....             | 74 mmHg or below.            |
| 32 mmHg .....             | 73 mmHg or below.            |
| 33 mmHg .....             | 72 mmHg or below.            |
| 34 mmHg .....             | 71 mmHg or below.            |
| 35 mmHg .....             | 70 mmHg or below.            |
| 36 mmHg .....             | 69 mmHg or below.            |
| 37 mmHg .....             | 68 mmHg or below.            |
| 38 mmHg .....             | 67 mmHg or below.            |
| 39 mmHg .....             | 66 mmHg or below.            |
| 40–49 mmHg .....          | 65 mmHg or below.            |
| Above 50 mmHg .....       | Any value.                   |

For arterial blood-gas studies performed at test locations above 3,000 feet above sea level:

| Arterial pCO <sub>2</sub> | and arterial pO <sub>2</sub> |
|---------------------------|------------------------------|
| 25 mmHg or below .....    | 75 mmHg or below.            |
| 26 mmHg .....             | 74 mmHg or below.            |
| 27 mmHg .....             | 73 mmHg or below.            |
| 28 mmHg .....             | 72 mmHg or below.            |
| 29 mmHg .....             | 71 mmHg or below.            |
| 30 mmHg .....             | 70 mmHg or below.            |
| 31 mmHg .....             | 69 mmHg or below.            |
| 32 mmHg .....             | 68 mmHg or below.            |
| 33 mmHg .....             | 67 mmHg or below.            |
| 34 mmHg .....             | 66 mmHg or below.            |
| 35 mmHg .....             | 65 mmHg or below.            |
| 36 mmHg .....             | 64 mmHg or below.            |
| 37 mmHg .....             | 63 mmHg or below.            |
| 38 mmHg .....             | 62 mmHg or below.            |
| 39 mmHg .....             | 61 mmHg or below.            |
| 40–49 mmHg .....          | 60 mmHg or below.            |
| Above 50 mmHg .....       | Any value.                   |

## APPENDIX C—RADIATION EXPOSURE COMPENSATION ACT OFFSET WORKSHEET—ON SITE PARTICIPANTS

[Present CPI = 185.20]

| VA payments<br>year | Payment | Indicated year CPI | Claim #<br>* inflated PV |
|---------------------|---------|--------------------|--------------------------|
| 1960                |         | 29.60              | \$0.00                   |
| 1961                |         | 29.90              | \$0.00                   |
| 1962                |         | 30.20              | \$0.00                   |
| 1963                |         | 30.60              | \$0.00                   |
| 1964                |         | 31.00              | \$0.00                   |
| 1965                |         | 31.50              | \$0.00                   |
| 1966                |         | 32.40              | \$0.00                   |
| 1967                |         | 33.40              | \$0.00                   |

APPENDIX C—RADIATION EXPOSURE COMPENSATION ACT OFFSET WORKSHEET—ON SITE PARTICIPANTS—Continued  
[Present CPI = 185.20]

| VA payments<br>year | Payment | Indicated year CPI | Claim #<br>* inflated PV |
|---------------------|---------|--------------------|--------------------------|
| 1968                |         | 34.80              | \$0.00                   |
| 1969                |         | 36.70              | \$0.00                   |
| 1970                |         | 38.80              | \$0.00                   |
| 1971                |         | 40.50              | \$0.00                   |
| 1972                |         | 41.80              | \$0.00                   |
| 1973                |         | 44.40              | \$0.00                   |
| 1974                |         | 49.30              | \$0.00                   |
| 1975                |         | 53.80              | \$0.00                   |
| 1976                |         | 56.90              | \$0.00                   |
| 1977                |         | 60.60              | \$0.00                   |
| 1978                |         | 65.20              | \$0.00                   |
| 1979                |         | 72.60              | \$0.00                   |
| 1980                |         | 82.40              | \$0.00                   |
| 1981                |         | 90.90              | \$0.00                   |
| 1982                |         | 96.50              | \$0.00                   |
| 1983                |         | 99.60              | \$0.00                   |
| 1984                |         | 103.90             | \$0.00                   |
| 1985                |         | 107.60             | \$0.00                   |
| 1986                |         | 109.60             | \$0.00                   |
| 1987                |         | 113.60             | \$0.00                   |
| 1988                |         | 118.30             | \$0.00                   |
| 1989                |         | 124.00             | \$0.00                   |
| 1990                |         | 130.70             | \$0.00                   |
| 1991                |         | 136.20             | \$0.00                   |
| 1992                |         | 140.30             | \$0.00                   |
| 1993                |         | 144.50             | \$0.00                   |
| 1994                |         | 148.20             | \$0.00                   |
| 1995                |         | 152.40             | \$0.00                   |
| 1996                |         | 156.90             | \$0.00                   |
| 1997                |         | 160.50             | \$0.00                   |
| 1998                |         | 163.00             | \$0.00                   |
| 1999                |         | 166.60             | \$0.00                   |
| 2000                |         | 172.20             | \$0.00                   |
| 2001                |         | 177.10             | \$0.00                   |
| 2002                |         | 179.90             | \$0.00                   |
| 2003                |         | 184.00             | \$0.00                   |

APPENDIX C—RADIATION EXPOSURE COMPENSATION ACT OFFSET WORKSHEET—ON SITE PARTICIPANTS—Continued  
[Present CPI = 185.20]

| VA payments<br>year | Payment                                      | Indicated year CPI                              | Claim #<br>* inflated PV |
|---------------------|--|---|--------------------------|
| 2004                | .....  | .....   | .....                    |
|                     | Total, Column 4                              | "Actuarial Present Value"<br>of past payments = | \$0.00                   |
|                     | NET AMOUNT OWED CLAIMANT (\$75,000 less APV) |   | \$75,000.00              |
|                     | .....  | .....   | .....                    |
|                     |  | Past CPI  |                          |
| xxxx                |  |   | ??                       |

\* Inflated PV is computed as {payment X (current CPI÷Year's CPI)}.

Dated: March 9, 2004.

**James B. Comey,**

*Deputy Attorney General.*

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