teachers in particular subjects. Standards vary greatly from state to state. The NSTA standards are more rigorous than those in many states, and Aldridge says the association hopes "to work with state boards of education to upgrade their standards."

NSTA currently offers certification for elementary science teachers, middle/junior high science teachers, and at the secondary level, for teachers of biology, chemistry, physics, physical science, earth and space science, and general science.

Requirements vary according to the grade level and subject the applicant teaches. To be certified, an elementary teacher must have completed 12 semester hours in laboratory or field-oriented science, including courses in biology, physical science, and earth science, have taken an elementary science methods course, and had student teaching experience.

High school teachers must have a bachelor's degree or its equivalent in science. They must also meet a double set of criteria, one general, a second in a specific subject. Satisfying the general criteria requires completion of a minimum of 50 semester hours in science, math, statistics, and computer applications, plus evidence of "breadth and depth in science background." Competency in basic mathematics, statistics, and computer applications must be demonstrated, for example, by the study of math at least to the level of introductory calculus.

Criteria for certification of a high school physics teacher would include, in addition to satisfying the general requirements, completion of 32 semester hours in physics in subject matter ranging from classical mechanics and electricity and magnetism to relativity and quantum mechanics.

The association has also been looking hard at advanced certification for highly qualified and able people in the field. "We're a little tired of the criticism of teachers," says Aldridge, and advanced certification is seen as a response.

As a basic qualification, a person would have to score above average on the regular Graduate Record Examination. With that on the record, says Aldridge, "You would have to agree that the person is just as smart as a person who goes into research."

Further requirements would be strong evidence of both teaching ability and educational leadership. As proof of the former, command of subject matter and performance in the classroom, probably documented on videotape, would be required. Leadership would be demonstrated by publications and the candidate's record of activities in the field. Aldridge says he expects the NSTA board to act on the advanced certification proposal in March. ■ **JOHN WALSH**

Treaty Compliance Rated Good

In the past few years, the United States and the Soviet Union have publicly accused each other of some 40 violations or potential violations of arms control agreements. And the accusations are expected to be stepped up soon when the Reagan Administration releases another new report on Soviet treaty compliance. The report is currently under review in the White House, where national security adviser Frank Carlucci is refereeing an interagency dispute over whether it should include a charge that the Soviets are preparing to break out of the 1972 Antiballistic Missile (ABM) Treaty (*Science,* 30 January, p. 524).

In contrast, a study released last week by Stanford University's Center for International Security and Arms Control* concludes that "overall, U.S. and Soviet compliance with the terms of existing arms control agreements has been good." The mutual public recriminations, coupled with some questionable Soviet and U.S. actions, have resulted in "a real crisis based on false perceptions about compliance," says the report.

The Stanford study notes that the Administration has already cited concerns about Soviet compliance as a reason for withdrawing from the SALT II Treaty and the SALT I Interim Agreement on Offensive Weapons. "U.S. withdrawal from these agreements is not justified on the basis of the Soviet compliance record," the report states. The study has been endorsed by 16 academics, most of whom are associated with the Stanford center, and six former government officials including three previous arms control negotiators.

The report, the product of an 18-month review of the record, did not find an unblemished history of treaty compliance. It cites one violation—the now infamous Krasnoyarsk radar in Siberia whose location is prohibited by the ABM Treaty—and three areas of "questionable" compliance, two on the Soviet side and one on the U.S. side.

The Stanford group says the evidence that Krasnoyarsk radar violates the ABM Treaty is compelling, and the Soviet's argument that it is to be used for space tracking—a permitted function—is not persuasive. The report therefore recommends that the Soviets should either dismantle the facility or open it up for international inspection to verify their claims about its functions.

The two questionable areas of Soviet compliance relate to the encryption of telemetry data during ballistic missile tests and a dispute over whether the SS-25 intercontinental ballistic missile is truly a new missile or a modification of an earlier intercontinental ballistic missile. In both cases, the study concludes that the Soviet practices fall in grey areas of the treaty where the language is ambiguous.

The one questionable area of U.S. compliance concerns programs to replace old early-warning radars at Thule in Greenland and Fylingdales in England with large phased-array radars. The concern is that they may contravene a clause in the ABM Treaty that attempts to restrict such radars to the periphery of each nation's territory (*Science*, 30 January, p. 525). Again, however, the study notes that the treaty lanugage is not crystal clear on this issue.

In addition, the report expresses alarm that recent Administration statements about potential early deployment of strategic defenses, coupled with moves to adopt a new interpretation of the ABM Treaty, threaten to undercut the treaty and "make highly unlikely any further offensive nuclear arms limits."

These conclusions echo many of the arguments the arms control community has made in response to previous U.S. and Soviet charges of treaty violations.

The Stanford group argues that disputes over compliance are inevitable. However, the study complains that in recent years both sides have resorted to acrimonious public accusations rather than attempt to resolve disputes through quiet diplomacy. In particular, the Standing Consultative Committee, a bilaterial panel that is supposed to thrash out treaty compliance disputes between the two sides has barely been functioning in recent years. Its central recommendation is that both sides abandon the public recriminations and breathe new life into the Standing Consultative Committee. However, it concedes that a return to quiet diplomacy may require a thaw in the current chilly U.S. Soviet relations. ■ **COLIN NORMAN**

*"Compliance and the Future of Arms Control," Center for International Security and Arms Control, Stanford University.