$$\int_0^{\varepsilon} \beta_1(\varepsilon_1)\, dF^*(\varepsilon_1) \le \frac{b_1}{b_1+d_1} \quad \text{and} \quad \int_0^{\varepsilon} \beta_2(\varepsilon-\varepsilon_1)\, dF^*(\varepsilon_1) \le \frac{b_2}{b_2+d_2}. \tag{3.45}$$

The left-hand sides of these two inequalities are the *expected probabilities of no detection* with respect to the distribution F^*. This means that the state will behave legally if the IAEA selects any distribution F^* such that the expected probabilities of no detection satisfy the two inequalities (3.45). To illustrate, let $\overline{\beta_1} = \int_0^{\varepsilon} \beta_1(\varepsilon_1)\, dF^*(\varepsilon_1)$ and $\overline{\beta_2} = \int_0^{\varepsilon} \beta_2(\varepsilon-\varepsilon_1)\, dF^*(\varepsilon_1)$. Then each type of violation is deterred provided

$$1-\overline{\beta_i} \ge \frac{d_i}{b_i+d_i}, \quad (i = 1, 2)$$

a condition strikingly similar to (1.2). This is the situation illustrated in Figure 3 of the text. Theorems 3.1 and 3.2 have identified the optimal $F^*(\cdot)$ in two special cases defined by the properties of $\beta_1(\cdot)$ and $\beta_2(\cdot)$.

Since (3.45) places no special requirements on the two detection probability functions, it follows that the solution (3.14) of Theorem 3.1 is also a solution under condition (3.26), and vice versa. For practical purposes, it is reasonable to use the theorems as presented here: Since the IAEA never knows precisely whether the conditions for legal behaviour are satisfied, it should use the effort distributions for the illegal case, according to the analytical forms of β_1 and β_2; if the legal case does apply, then no distribution of effort can improve on the distribution optimal for the illegal case.

Finally, some comments on the assumptions made in the foregoing analysis of Problem 3 are appropriate here. The modelling allows the players' values to be site-dependent; for instance, an undetected violation at a declared site may have a different value from one at an undeclared site. But it has been assumed that inspection processes at the two types of site are completely independent — no inspection ever provides any information about possible violations at the other type of site.

Certain aspects of the shapes of the functions linking detection probability and inspection effort (Figure A1) can only be guessed at. It can be assumed, at least to a first approximation, that all such functions are increasing, for additional inspection effort must always be useful. Some inspection problems are known for which the detection probability function is convex, at least for small values of inspection effort. However a law of diminishing returns is inevitable,