

A Study of SR-71 Utility for Post-Strike Reconnaissance

I. Introduction

This paper will examine the utility of the SR-71 force for the post-strike reconnaissance mission in both a [redacted] context. The value of the SR-71 for intelligence purposes is the subject of another paper. The issue is whether to phase down (or phase out) the SR-71 force in FY 73 from the level of [redacted] currently programmed.

The FY 72 budget currently contains \$93.4 million for support of SR-71s with \$80-\$113 million required for each of the next five years. A [redacted] from FY 71 to FY 72 ^{1/} resulted in a savings of \$17.6 million from the FY 71 budget (less than 16% but no further justification was made for this, [redacted] in force.) Table 1 below shows that the total cost is not necessarily a function of the number of aircraft. The major reduction in funding in FY 75 is due to the completion of a major overhaul program on the SR-71 aircraft. The POM costs differ from the 19 February FYDP but the Air Force claims this is in error and funds are to be restored to FYDP levels shown in Table 1.

Table 1

		SR-71 UE Aircraft and Costs (\$ Millions)							
		FY 69	FY 70	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76
UE	[redacted]								
	<u>1971 February FYDP</u>								
Investment									
	<u>Other Procurement</u>	24.4	27.4	21.1	21.1	21.1	21.1	21.1	21.1
Operations									
	O&M	74.0	68.8	61.0	64.3	77.9	47.7	45.8	
	Military Personnel	13.9	12.8	11.2	12.5	13.6	13.7	13.7	
	<u>Total Operations</u>	<u>87.9</u>	<u>81.6</u>	<u>72.2</u>	<u>76.8</u>	<u>91.5</u>	<u>61.4</u>	<u>59.5</u>	
TOA		113.2	110.0	93.4	97.9	112.6	82.5	80.6	

Section II will describe the SR-71 system in terms of its system characteristics. Section III will discuss pre-launch survival, penetration and target coverage capabilities. Section IV will discuss the utility of the information collected by the SR-71 in terms of satisfying U.S. post-strike objectives and describe alternative systems which can achieve the same capabilities. Section V contains an overall evaluation and summary of the contribution of the SR-71 including the impact of marginal reductions or complete phasing out of the force.

^{1/} Four UE phased out during last quarter of FY 71 thus causing cost savings to be reflected in FY 72 total rather than FY 71. Savings from FY 70 to FY 72 of 12.8 million is 17.4% of FY 70 total.

II. SR-71 System Description

The current (July [redacted]) fleet of SR-71s consists of [redacted] UE (one squadron) based at Beale AFB, California of which three aircraft are TDY at Kadena AFB, Okinawa. [redacted] are distributed as shown in Table 2. There are currently [redacted] crews and [redacted] staff pilots to support SR-71 operations.

Table 2

Distribution of SR-71s

<u>Number</u>	<u>Model</u>	<u>Location/Use</u>
[redacted]	A	Palmdale, California (AF Plant 42)/Test
[redacted]	A	Kadena, Beale/Non-Operational Active
[redacted]	A	Palmdale/Extended Storage
[redacted]	A	NASA
[redacted]	B,C	Beal/Trainers
[redacted]	A	Beale, Kadena/Operational UE

The SR-71 is a [redacted] aircraft capable of altitudes of 75,000 [redacted] ft. and is highly [redacted]. Table 3 shows other relevant characteristics. The unrefueled range of [redacted] is a [redacted] distance. The [redacted] on tankers is evidenced by this [redacted] and the fact that it takes [redacted] between refueling with essentially [redacted] loiter time should a KC-135Q fail to appear on schedule. After flameout an SR-71 pilot has approximately 9 miles to find a suitable landing area or bail out.

Table 3

Characteristics of SR-71

Cruise and Max Speed	[redacted]
Engines	Twin [redacted]
Cruise Altitude	75,000 [redacted]
Refuel Altitude	25,000-27,000 feet
Refuel Time	10-15 minutes (70,000 lbs.)
Unrefueled Range	[redacted]
Radius of Turn	[redacted]
Take Off-Distance	6000 ft (90° F, Sea Level)
Take Off-Speed	214 kts.
Landing-Distance	3000 feet
Landing-Speed	165 kts.

In addition to bases at Beale AFB, California and Kadena AFB, Okinawa, JP-7 fuel is available at CONUS Bases: [REDACTED]

[REDACTED] Overseas fuel locations are at [REDACTED] Plans are being formulated to station two SR-71s at [REDACTED]

The aircraft crew consists of a pilot in the front seat, and a reconnaissance systems officer directly behind him who has no capability to fly the airplane other than by entering coordinates into the navigation system computer and allowing the autopilot to take over. Normal missions (other than take-off and landing) are flown by the autopilot based on pre-programmed tapes inserted into the navigational system by an electronics warfare officer prior to take-off. The pilot only maintains altitude after climb and prior to descent but can fly the airplane by switching off the autopilot. [REDACTED]

[REDACTED] The astro-inertial navigational system can guide the aircraft to within [REDACTED] of the programmed track. Mission profiles are generated by hand and converted to a mission tape which is fed into the navigational system's computer memory. A minimum of [REDACTED] is required to generate such a tape. [REDACTED]

There are five basic sensor systems on the SR-71:

-- High Resolution Radar (HRR) an [REDACTED] side looking radar with resolution of [REDACTED] a swathwidth of [REDACTED] on [REDACTED] of the aircraft and sufficient film for [REDACTED] coverage.

-- Infrared (IR) -- a [REDACTED] scan angle allows coverage [REDACTED] of the aircraft [REDACTED] with an [REDACTED] and [REDACTED] coverage.

-- Operational Objective Cameras -- provide visual coverage [REDACTED] of the aircraft [REDACTED] with a [REDACTED] resolution and [REDACTED] coverage.

-- Terminal Objective Cameras -- provide visual coverage over a [REDACTED] square area [REDACTED] the aircraft with a resolution of [REDACTED] and [REDACTED] coverage.

-- Technical Objective Cameras -- provide visual coverage [REDACTED] width at a resolution of [REDACTED] for [REDACTED] coverage of [REDACTED] with [REDACTED]

In addition an Electromagnetic Reconnaissance System (EMR) receiver is available for [redacted] information (not [redacted]). It can search [redacted] simultaneously between [redacted] and can be preprogrammed to pick up a particular frequency and lock on and record on it. Any defensive equipment (ECM) would have to replace one of the operational objective systems. Two million dollars is in the FY 72 budget for development work on an IR warning system and possible counter.

A fleet of [redacted] KC-135Q tankers currently exists with special tanks to handle [redacted] fuel for the SR-71 as well as JP-4 fuel for themselves. [redacted] for [redacted] of these to be available exclusively for SR-71 support in the event of a nuclear exchange. Two sq. are stationed at Beale AFB and one at McCoy AFB. Ten KC-135Qs are also stationed on TDY at Kadena AFB. Tankers must be pre-positioned due to the SR-71's factor of [redacted] speed advantage over the KC-135. In a [redacted] flight between tankers the SR-71 burns about [redacted] of fuel per hour and must therefore be refueled every [redacted] hours. Normal peacetime missions usually use [redacted] tankers. The [redacted] for [redacted] to get SR-71s from [redacted] to entry points over [redacted].

There are three basic processing centers for the SR-71 sensor information plus one mobile processing center at Beale AFB. Their capabilities are shown below:

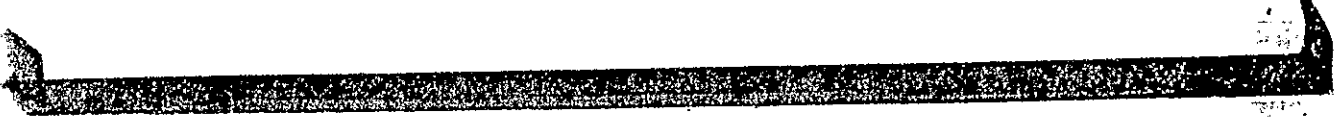
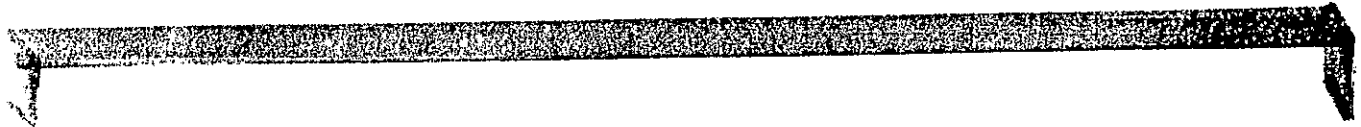
Table 4

<u>Center</u>	<u>Sensor Processing Capability</u>			
	<u>Location</u>	<u>Visual</u>	<u>SLR a/</u>	<u>EMR b/</u>
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

- a/ Side Looking Radar
- b/ Electromagnetic Reconnaissance System
- c/ Reconnaissance Technical Squadron
- d/ Overseas Processing Interpretation Center - Europe

Even after processing the data, it must be transmitted to National Command Authorities (NCA). The minimum processing time is about [redacted] hours with [redacted] hours additional required to transmit Initial Photo-Interpretation Reports (IPIR) from Europe to Washington. A KC-135 would take [redacted] hours to fly the high resolution results from [redacted]. Thus, a minimum of [redacted] is required to plan a mission, fly it, and return results to [redacted]. A more likely estimate under current procedures is [redacted]. This time dependency will be discussed more completely in Section IV after an examination of survival and coverage characteristics of the SR-

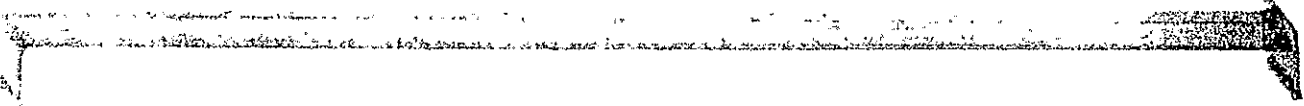
Table 5



The SR-71 currently carries several defensive systems for protection. By mid-FY 72 [redacted] will also be carried. The FY72 budget has \$2 million for RDT&E on [redacted] new systems: [redacted] These systems and the threats they are designed to counter are shown in Table 7.

[redacted]

Figure 1



Coverage

Table 8 shows the SIOP target and reconnaissance summary. Note that only about [REDACTED]

Two types of assessment of this target base are required:

-- Generalized estimates of how well our ICBM/SLEM forces performed would be of value to NCA since such estimates would increase confidence in estimates of the overall performance of the SIOP. [REDACTED]

-- Specific target destruction information is required to [REDACTED]

The SR-71 missions in Rev. I of the SIOP covered an average of [REDACTED]

[REDACTED] All SIOP installations attacked could be covered with [REDACTED] Only [REDACTED] in the new SIOP. [REDACTED]

[REDACTED] a sample of targets must be investigated and an appropriate sample size (required number of aircraft) must be determined. Table 9 below shows the estimates and 95% confidence limits on the estimates of Soviet site destruction as a function of the percentage of sites destroyed in the sample. [REDACTED]

Table 8
SIOP Target and Reconnaissance Summary

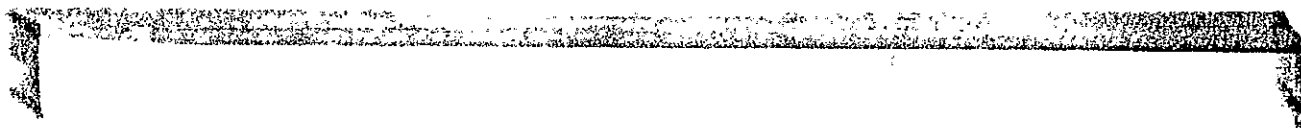


Table 9

Estimated % of Total Targets Destroyed Based on % of Sample Destroyed

of SR-71 Sorties

% of Sample Destroyed

[REDACTED]

17-23	18-22	18-22	19-21
37-43	38-42	38-42	38-42
57-63	58-62	58-62	58-62
77-83	78-82	78-82	79-81

If [REDACTED] are surveyed by [REDACTED] sorties, for example, and 20% are destroyed, then we are 95% certain that the total destroyed lies between [REDACTED]. An increase to [REDACTED] sorties narrows this estimate to 18-22%. The loss of information of this general nature is thus not particularly sensitive to reductions in the number of SR-71s (i.e., confidence boundaries are widened only 1-2% by 1-8 aircraft reduction over current numbers).

The data collected [REDACTED] after the start of a nuclear exchange must be downloaded from the SR-71s, transported to [REDACTED] and processed at [REDACTED]

[REDACTED]

IV. Utility of SR-71 Information.

The information provided by the SR-71 should [REDACTED]

[REDACTED] In all cases data are provided by the [REDACTED] in the SR-71.

SIOP Execution

After the SIOP has been executed, the United States must determine [REDACTED]

[REDACTED]

[REDACTED]

The first objective requires a determination of additional or residual targets. The key parameters are time to find targets and time to decide on which of these to attack. The SR-71 will provide photographic information on targets [REDACTED] after its mission if it has been preplanned. If a mission tape has to be generated it will require [REDACTED] information is not available [REDACTED]

If the information is to be used for [REDACTED] as in the second objective, then sample target information is required and [REDACTED]

A basic premise of the SR-71 mission is that the NCA [REDACTED] of the SIOP this may not be the case. In a [REDACTED]

Nuclear Warfighting

If deterrence fails and the United States is forced into a war-waging environment timely information is [REDACTED] continue for some time. The SR-71 information would be valuable in terms of assesment of remaining forces, [REDACTED] In this type scenario, it is not clear who will use the "hard copy" information or the [REDACTED] of it.

[REDACTED]

[REDACTED] might provide adequate coverage for this type environment. Again the timeliness factor might suggest [REDACTED] is more valuable.

The major alternatives to an SR-71 system for post-strike reconnaissance are:

- no system
- other manned aircraft systems
- satellite systems
- drone systems

It is probable that some type of surveillance system will be necessary for the three environments mentioned though the specific requirement for "hard copy" information is not substantial. Other manned aircraft systems in SAC such as the [redacted] which currently provides [redacted] and the [redacted] which provides [redacted] information can be supplemented by shorter range RF-4s and other systems.

Current [redacted] and others can provide photo coverage but at [redacted] than the SR-71. [redacted] may also be vulnerable to direct attack, since [redacted] are possible, or cloud interference. Drone systems have been used for intelligence collection.

[redacted] Needs more words on [redacted] as well as drone systems.

V. Overall Evaluation of SR-71 Utility for Post-Strike Reconnaissance

The current SR-71 force of [redacted] active plus [redacted] non-operational active aircraft performs post-strike reconnaissance of [redacted] of the military targets after [redacted] but provides additional coverage of about [redacted] that were not targeted in the SIOP. The requirement for generalized estimates of how well U.S. strategic forces have done can be satisfied by [redacted]. A requirement for specific target destruction information increases the demand for SR-71s or other surveillance systems. This requirement is highly scenario dependent.

If the SIOP is executed in response to a surprise attack on the United States, [redacted] If crisis warning is obtained so that the SR-71s [redacted] of attack. Their only [redacted] If they survive this attack they then critically on pre-deployed KC-135Q tankers to get them to the SIOP [redacted] area. If they make it to the target area they then must [redacted] which may have [redacted] after [redacted] from airborne interceptors [redacted] to be effective with [redacted] are employed [redacted]

The cost savings produced by a reduction of 4 aircraft in FY 71 amounted to only \$3-\$5 million per aircraft since the special logistics system for SR-71 support was maintained.