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Report to Spaceport Committee

by
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Executive Secretary
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Problem

Assess Utah's chances of being selected as the prime space shuttle development and operational site and if indicated develop a strategy that will maximize Utah's chances for selection.

Hypotheses

1. Utah possesses a site that is uniquely qualified to meet both NASA and Air Force long-range operational requirements.

2. The long-range costs to establish a new site in Utah are not significantly higher than at KSC, White Sands, WTR, or Edwards Air Force Base when operational total costs and all mission requirements are considered.

3. Congress will support the increased initial costs of a new site if long-range costs can be shown to be lower than alternative plans.

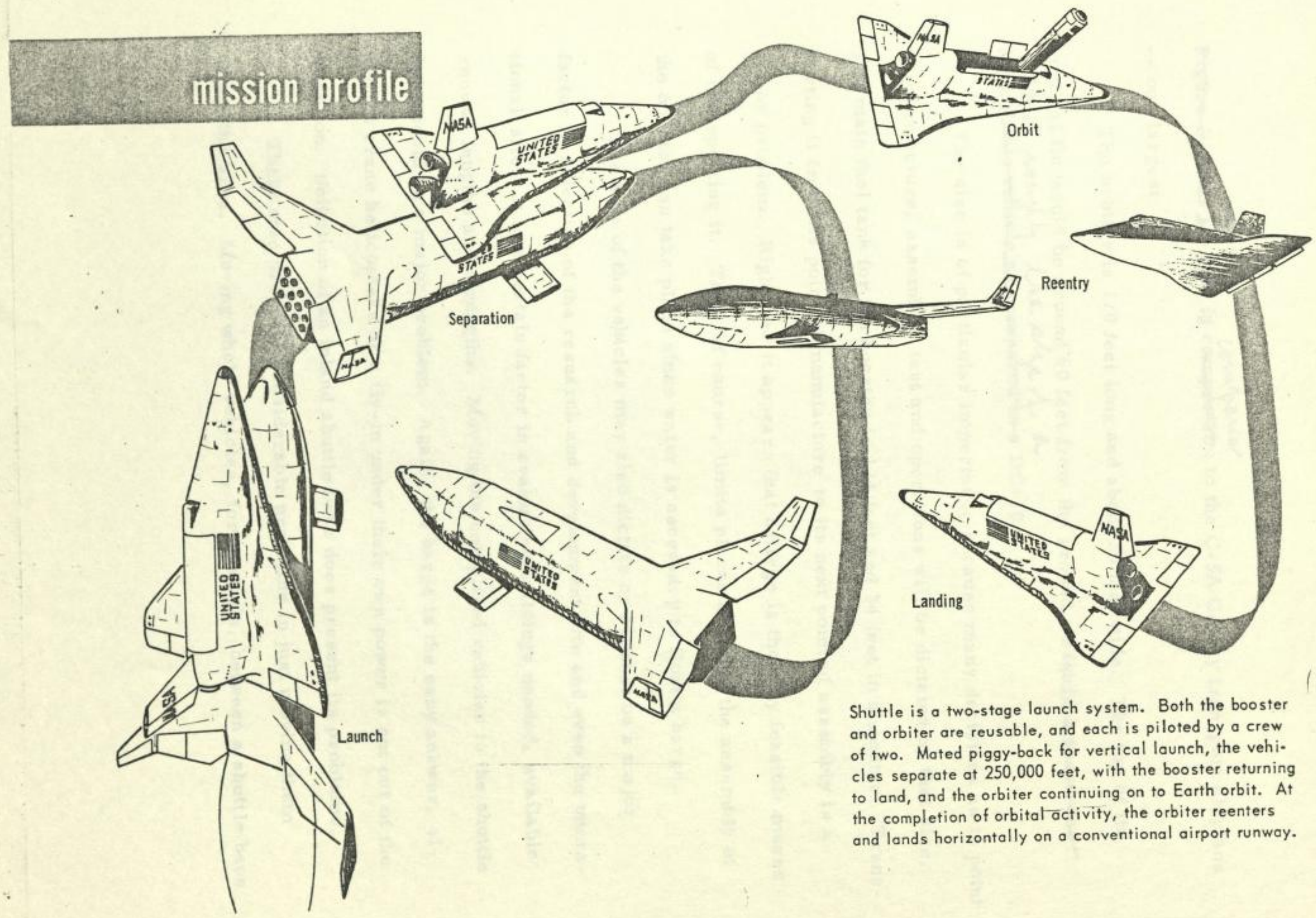
4. Should hypothesis #3 prove invalid and should other non-economic factors dictate selection of KSC for development of the shuttle and for NASA operations, then the Air Force will later need a site for their missions. Criteria for that site only can be met within the Great Salt Lake Desert.

The Space Shuttle Program - General

The space shuttle program is conceived as a means of continuing and expanding man's exploration of space and of the earth at a reasonable cost. Space exploration or exploitation to date has been with expendable vehicles. Putting payload into orbit has been accomplished at a cost of about $1,000/lb. It is the goal of the space shuttle program to reduce this cost to less than $100/lb. through the use of recoverable reusable vehicles.

Basically each shuttle system will consist of two vehicles -- a booster and an orbiter. The booster which is nothing more than a rocket powered flying fuel tank carries the orbiter piggyback to about a 40 mile altitude. The orbiter then disengages from the booster and continues into orbit. The booster descends back into the earth's atmosphere, starts its air-breathing jet engines and flies back to the space shuttle base like a conventional airplane. The orbiter delivers its payload in orbit, gathers up refuse, equipment for repair or men and returns to earth and the space shuttle base (Figure 1). It may or may not carry air-breathing jet engines for its return through the atmosphere.

Both the booster and the orbiter are very large by today's standards. The booster is about 270 feet long and more than 40 feet in diameter. In a horizontal position its vertical fin would rise about 65 feet above the ground.



Shuttle is a two-stage launch system. Both the booster and orbiter are reusable, and each is piloted by a crew of two. Mated piggy-back for vertical launch, the vehicles separate at 250,000 feet, with the booster returning to land, and the orbiter continuing on to Earth orbit. At the completion of orbital activity, the orbiter reenters and lands horizontally on a conventional airport runway.

Figure 1

~~Figure 2 shows~~ Its size ~~in comparison~~ compares to the C-5A Galaxy transport airplane -- our largest.

The orbiter is 170 feet long and about 20 feet wide. The top of its vertical fin would be around 60 feet from the ground. ~~Figure 2 shows the size of this vehicle as compared to a~~ It is roughly the size of a DC-10.

The size is of particular importance because many decisions as to point of manufacture, assembly, test and operations will be dictated by that size. The main fuel tank for the booster is 134 feet and 34 feet in diameter. Transporting it from its point of manufacture to its next point of assembly is a major problem. Right now it appears that a barge is the only feasible means of transporting it. This, of course, limits places at which the assembly of the booster can take place since water is necessary to float a barge.

The size of the vehicles may also dictate or at least be a major factor in selection of the research and development site and even the operational site. It is a certain factor in evaluating buildings needed, available runway lengths and strengths. Moving the completed vehicles to the shuttle base could be a major problem. Again, the barge is the easy answer, although crane helicopters or a fly-in under their own power is not out of the question. Selection of an inland shuttle base does present its problems.

Their size presents considerable problems in just moving them about the area. Moving whole vehicles, for example, between a shuttle base

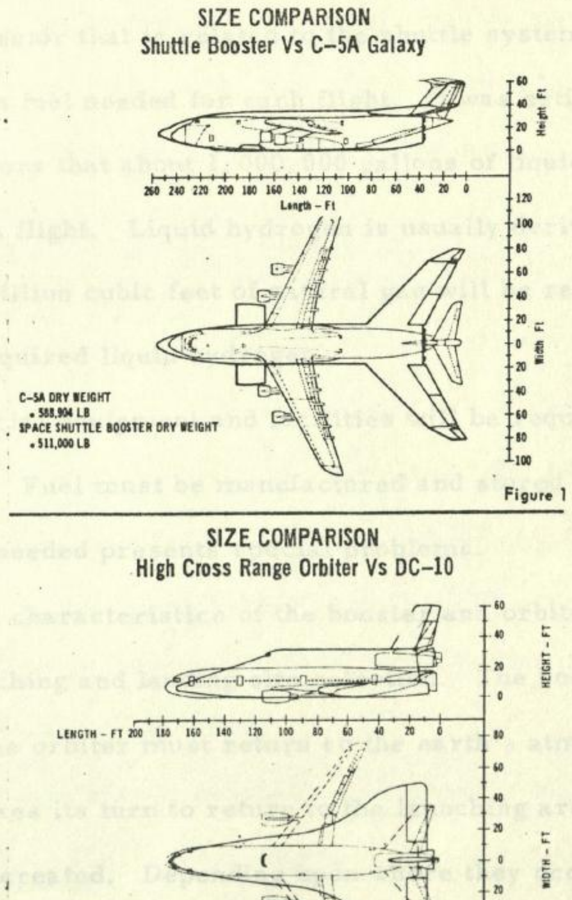

SIZE COMPARISON
Shuttle Booster Vs C-5A Galaxy
Length – Ft
Height Ft
Width Ft
C-5A DRY WEIGHT
= 588,904 LB
SPACE SHUTTLE BOOSTER DRY WEIGHT
= 511,000 LB
Figure 1
SIZE COMPARISON
High Cross Range Orbiter Vs DC-10
LENGTH – FT
HEIGHT – FT
WIDTH – FT
DC-10 DRY WEIGHT
= 225,000 LB
HIGH CROSS RANGE ORBITER DRY WEIGHT
= 211,600 LB

Figure 2

somewhere on the Great Salt Lake Desert to Hill Air Force Base for maintenance would be impossible by rail or highway. Again, only a fly-in under their own power is feasible. This may present serious operational difficulty and negate the assumed advantages of having Hill Air Force Base next door.

Another factor that is related to the shuttle system size is the amount of liquid hydrogen fuel needed for each flight. It was estimated by one of the Phase B contractors that about 1,000,000 gallons of liquid hydrogen will be required for each flight. Liquid hydrogen is usually derived from natural gas. About 18 million cubic feet of natural gas will be required per day to produce the required liquid hydrogen.

Much special equipment and facilities will be required to support the shuttle program. Fuel must be manufactured and stored and liquid hydrogen in the quantities needed presents special problems.

The flight characteristics of the booster and orbiters present special problems to launching and landing site selection. The booster after disengagement from the orbiter must return to the earth's atmosphere. As it descends and makes its turn to return to the launching area rather severe sonic booms are created. Depending upon where they occur, significant areas on the ground are affected. Once in the atmosphere it must start its air breathing jet engines in order to fly back to the launching area. At present, 10 engines are required in order to give it a 10,000 feet-altitude cruise ceiling. Obviously the terrain over which it must fly must be considerably lower than 10,000 feet. Additional engines can be added to increase its cruise ceiling but weight and complexity also increase perhaps to a point of non-acceptability.

The orbiter will probably return from orbit to the launching area without jet engines and, therefore, size of the landing runways and height of surrounding terrain are of considerable importance.

Although the space shuttle launches probably will never reach airline frequency, it is planned to launch up to 75 per year. This is a far-cry from the present Apollo schedule of two per year and will impose a severe burden on the launching base. The launching site will have to include an assembly-disassembly capability, post-flight refurbishment and maintenance capability, and payload loading and unloading facilities. Since shuttle missions will include returning satellites to earth for repair and re-insertion into orbit, undoubtedly some sophisticated satellite repair shops will even be necessary at the launching sites.

In all the space shuttle program is an order of magnitude more complex than the Apollo. It also offers the first real opportunity for a direct and continuing benefit to the inhabitants of the earth at a cost that is commensurate with the benefits derived.

Operations Site Facility Requirements

The general facility definitions for a shuttle launch site have been given as follows:

Cargo operations
Pre-launch
Maintenance (vehicles)
Landing field and taxiways
Safing facility
Administrative and engineering offices
Flight crew training
Ordnance test
Ordnance storage
Cleaning and calibration
Instrumentation
Data processing
Propellant production and storage
Warehousing
Food service
Base medical
Bio-medical
Meteorological
Tracking
General shops
Motor pool
Security
Fire department stations
Power stations
Water supply
Barging or other large capability transporting system
Photographic
Geodetic
Roadways
Sewage treatment
Site maintenance
Calibration laboratory
Communications
Launch control center
Mobile launches/transporter

Crawlerway
Launch pads (2)
- Flame trench
- Deflectors
- Gas service areas
- Propellant storage
- Emergency evacuation and protection
- Water station

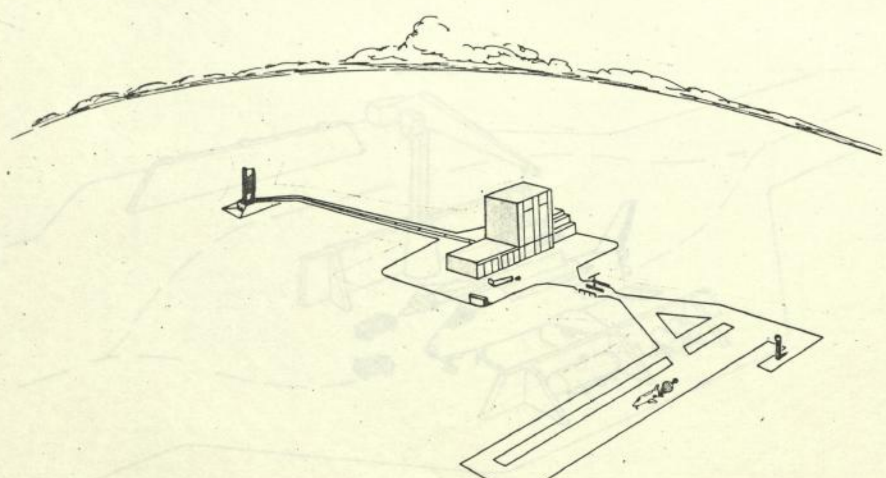
Power distribution
Systems equipment areas
Pad hardstand
Access roads
Fire protection areas

Site selection will be based primarily on the cost to provide these facilities, but will also be influenced by the following:

1. Ability to perform missions.
2. Safety considerations - population and crew.
3. Operational costs. - short range vs long range
4. Security.
5. Living accomodations for personnel.
6. Availability of operating personnel.
7. Climate.
8. Availability of suitable land. surrounding terrain
9. Alternate downrange site availability.
10. Effect on people presently in program.
11. Existing communications networks.
12. Growth potential.

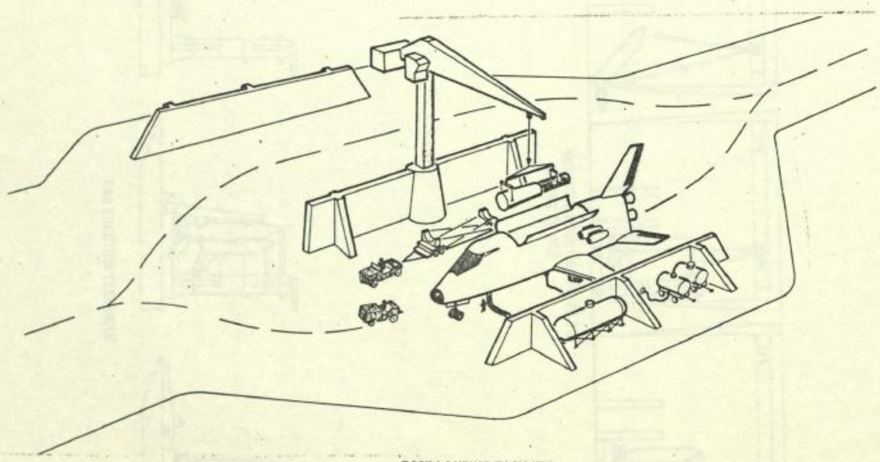
Instructions have been given Phase B contractors to make full use of existing facilities.

Some sketches of various site operations are shown in Figures 3, 4 and 5.



CENTRALIZED GROUND OPERATIONS INSTALLATION

Figure 3



POST LANDING FACILITY

Figure 4

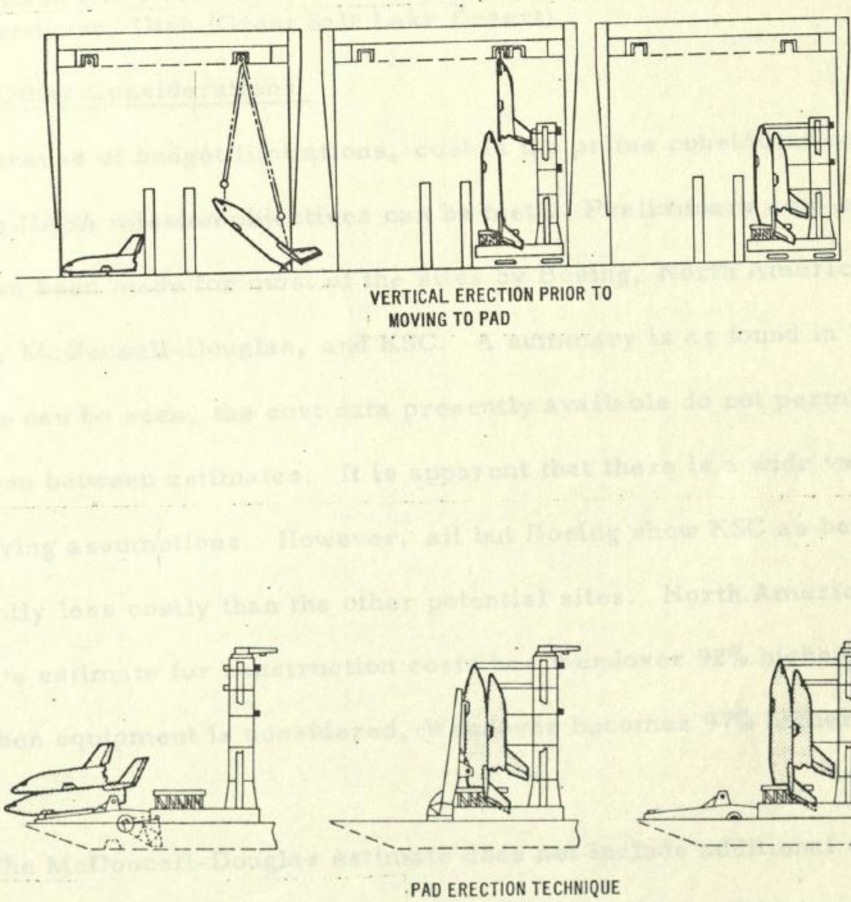

VERTICAL ERECTION PRIOR TO MOVING TO PAD
PAD ERECTION TECHNIQUE

Figure 5

Site Comparisons

The sites under serious consideration by NASA are as follows:

Kennedy Space Center
White Sands Proving Ground
Edwards Air Force Base
Western Test Range (Vandenberg)
Clinton Air Force Base (Oklahoma)
Wendover, Utah (Great Salt Lake Desert)

Cost and Other Considerations

Because of budget limitations, cost is the prime consideration (assuming NASA mission objectives can be met). Preliminary cost estimates have been made for most of the sites by Boeing, North American Rockwell, McDonnell-Douglas, and KSC. A summary is as found in Table 1.

As can be seen, the cost data presently available do not permit direct comparison between estimates. It is apparent that there is a wide variance in underlying assumptions. However, all but Boeing show KSC as being significantly less costly than the other potential sites. North American Rockwell's estimate for construction costs has Wendover 92% higher than KSC. When equipment is considered, Wendover becomes 97% higher than KSC.

The McDonnell-Douglas estimate does not include additional costs for support areas for Wendover, but still shows it to be 264% higher than KSC. The KSC estimate has still less credibility than the others and understandably comes up with Wendover being 348% higher than KSC for vertical

Facility Cost Estimates - Millions of Dollars

Estimating Organization	KSC	White Sands (Holloman AFB)	Edwards AFB	WTR (Vandenberg AFB)	Clinton AFB	Great S. L. (Wendover AFB)
(1) Boeing Co. (Construction only)	206	200	234	225		212
~~(2) North American Rockwell~~ Contractor X (Construction only)	150	239	227	218	227	288
(2) North American Rockwell (Construction & equipment costs)	287	446	436	428	479	565
Mc~~Donnell-Douglas~~ contractor Y ~~Corp. (Construction only)~~	87	317+		284	317+	317+
KSC (including equip., activation & contingencies)						
Vertical Test	355	940	1,184	1,022		1,590
Horizontal Test	511	960	1,207	1,136		1,603

Table 1

Notes:

(1) Assumptions

a. Estimates are not total costs -- they are differential to some extent. Some items are assumed "constant" for all sites and costs are not included.

b. Estimate for Wendover based on Wendover base. Assumes use of some existing facilities cost would be higher if new site located elsewhere on GSLD.

c. At WTR utilize portion of MOL launch pad. Assume 40% of launch pad area facilities and GSE can be used for space shuttle.

d. At KSC, utilize portion of launch pad 39B. Assume 40% of launch pad area facilities and GSE can be used for space shuttle.

e. Cost of landing field at each site based upon length adjusted for elevation (10,000 feet at sea level).

f. Construction costs reflect 1970 base. Design costs not included.

(2) Assumptions

a. Includes 13% for design, supervision, and administration.

b. Wendover costs based on use of Wendover base. Construction costs are high.

launches and 214% higher for horizontal launches.

It is difficult to assess the Boeing estimates. If they are correct and the others are wrong, then KSC is no bargain. However, considering the list of facility requirements reviewed earlier, the accuracy of the Boeing estimate is questionable.

It is reasonable to conclude that KSC offers significant initial cost advantages over all other sites. This cost advantage is gained at the expense of some operational options:

1. It is predicated upon the continuation of a vertical mating and vertical movement of the vehicles to the launching pad. While the contractor engineers see this as an acceptable method (some even consider it desirable), it may prove cumbersome and costly in the long run. Adoption of the technique of horizontal mating and movement to the pad would increase the cost of KSC ~~but would not reduce the cost level of other sites.~~ but not the cost of other sites -

2. The ability of KSC to expand to accomodate future shuttle program growth is limited. Sometime in the future another site ~~might still~~ will be needed, ~~This is conjecture at this point but reasonable~~ conjecture.

3. KSC cannot provide all axis launch capability and, therefore, cannot accomodate all Air Force missions. Another launching site for the Air Force is likely if KSC is selected as the initial site.

got of adding

A key NASA official indicated that an alternate site would have to yield a significant savings over KSC to warrant selection over KSC. Apparently, the problem of moving people already established at KSC is considered to be substantially more difficult than is the problem of not selecting another site. Also, it is easier to get funding to modify an existing facility than it is to get funding to abandon a facility and build a new one.

In short, the technical problems are outweighed by the political. The program can be largely conducted at KSC and those portions that cannot will be tabled.

This leads us to question the Air Force role and attitude.

Air Force Role

The Air Force intends to be deeply involved in the shuttle program. It has no new unmanned missile systems planned and seems committed to the shuttle. At the same time, the Air Force is faced with budget problems. It does not have sufficient funds to pursue its B-1 bomber program, F-15 fighter program and still commit much to the early stages of the shuttle program. As a result, the Air Force ~~has~~ may have to assume a muted role in the shuttle at this time. It was successful in gaining NASA's concurrence on extended cross ranging capability (although this may still become an issue), but probably will not exert significant influence on the selection of an initial launch site. Indeed, some Air ~~Force shuttle site enthusiasts have been told privately~~ to "cool it." The Air Force is simply unable to commit enough funds to the program at this time to be a full participating partner.

This does not mean that the Air Force is unaware of the deficiencies of some NASA proposed operational sites. They are aware that KSC and White Sands cannot provide the launch direction capability needed without overflying foreign countries. They are also aware of the security problems of these sites. Funding problems simply may force them to accept KSC as a beginning point with a second launching facility exclusively for Air Force use as a future alternate. Indeed, this may even be preferred by some Air Force people. Sharing a common facility with NASA may not be as desirable to some as a wholely owned and operated Air Force site.

Should the program develop in this way, it appears that only two of the sites presently identified could satisfy Air Force requirements. The Western Test Range (Vandenberg) is one and Wendover (Great Salt Lake Desert) is the other. WTR provides the south polar launch capability needed and is already in operation by the Air Force. Easterly equatorial launches could pose a problem because of the surrounding densely populated area. Security at WTR could also be a problem because of the proximity of the Pacific Ocean. However, the Air Force has been launching missions from there for several years with little apparent concern for foreign observers. The continued growth of the civilian population around the WTR area could become a serious problem in the future. add more specific popul. info here

The Great Salt Lake Desert can provide an ideal Air Force operational launch site -- an all axis launch capability. Government land, isolation, proximity to a major urban center, potential adequate living accomodations relatively near any one of several launching sites, etc., make it an excellent candidate for an Air Force shuttle site.

~~It is apparent that the Department of Defense is thinking this way. They recently contracted with North American Rockwell and possibly with McDonnell-Douglas to make an analysis of the cost to up-date WTR (Vandenberg AFB) and Wendover AFB to accomodate the shuttle program. One preliminary cost estimate is as follows:~~

The Department of Defense recently contracted with North American-Rockwell to make an analysis of the cost to up date WTR (Vandenberg AFB) and Wendover AFB to accomodate the shuttle program. This has now been broadened to include other potential sites within the Great Salt Lake desert. ~~Preliminary estimates indicate~~ It is not expected that the cost differences will be significant if the resources of Hill Air Force Base are considered.

Table 2

Cost (Millions of Dollars)

	Vandenberg AFB (WTR)			Wendover AFB		
Assumed shuttlefleet size	4	6-7 max	8-10 max	4	6-7 max	8-10 max
Assumed rate, launches/yr	15	30	45	15	30	45
Construction	141	149	162	201	219	237
Equipment	104	106	108	143	145	148
Activation	61	64	68	86	91	97
Total	306	319	338	430	455	482

The Wendover construction estimates could be as much as 15% too high. However, again as with KSC the cost of modifying Vandenberg, a current operational base, is considerably less than for Wendover. If another Utah site other than Wendover AFB were evaluated, the cost estimate might prove higher. A Michaels AFB site could be lower or comparable, but a Cedar Mountain or Lucin Cut-Off site would undoubtedly be higher. This apparent cost difference may not be so significant in view of the operational advantages presented by a Great Salt Lake Desert (GSLD) location. Indeed, it appears that some long-run operational cost advantages are gained because of improved weather conditions and altitude. These operational advantages also exist for NASA missions.

Geographic Cost Benefits

Weather: It is obvious that the fewer days of bad weather encountered the less costly will be a launching program. Scrubbed missions or launch delays are costly. Therefore, the site having a history of good weather will provide significant cost benefits to the shuttle program. We have not been able to quantify the weather factor, but it is apparent that a Wendover site offers significantly fewer days of inclement weather than does KSC or WTR.

Altitude: Less fuel is required to place a vehicle in orbit when launched from a higher elevation. This is true for both equatorial and polar launches. This gain may be reflected in less fuel cost, smaller vehicles, or increased payload. For equatorial launches this gain may be offset somewhat depending upon the latitude from which the launch is made. A vehicle receives less help from the earth's rotation at higher latitudes.

The potential gains were calculated for equatorial and polar launches in Table 3 and for polar launches in Table 4. In both cases KSC is assumed to be the baseline, that is, all costs are relative to the cost of launching from KSC. 445 launches and various payload values per lb. of $150 also are assumed. These tables were derived from data furnished by North American Rockwell Corporation.

from Vandenberg AFB and a Utah, and Great Salt Lake Desert site.

The cost of putting a payload into orbit at the beginning stages of a program have been estimated at $20,000 per pound. Present techniques reduce cost to about $1000 per pound. The shuttle should reduce cost to about $100-$150 per pound.

The tables assume that all launches are either equatorial or polar. Final savings depend upon the mix between equatorial and polar launches that actually occur. The tables are useful, however, to indicate the magnitude of savings possible by launching from higher elevations.

Vandenberg shows more cost than KSC for equatorial launches and a net savings for polar launches. White Sands shows a greater savings for equatorial launches than GSLD, but less for polar launches. Actually, there is little to choose between White Sands and GSLD in this case.

A significant difference does exist in considering Vandenberg versus GSLD for Air Force all types of launches missions. For equatorial launches Vandenberg shows a net gain in cost of $38 million as compared to a GSLD net reduction in cost of $153 million. For polar launches Vandenberg shows a cost reduction of $33 million while GSLD shows a reduction of $287 million.

savings as high as

By launching from a Utah site savings of from $86,000,000 per launch to $645,000 per launch could be realized. These savings are significantly higher than could be realized from a Vandenberg A.F.B. site.

Equatorial Launches

Candidate Launch Sites - Payload Evaluation in Dollars

Site	Design Ref. Mission Payload Effect Per Launch (lb) Elevation	Latitude	Net Gain or Loss	No. of Launches Total Program *	ΔPayload Total Program Lb.	Payload Value Per Lb. $*	ΔValue Total Program $ Millions
KSC	Baseline	Baseline	Baseline	---	---	---	---
Vandenberg	(+) 500*	(-) 1075*	(-) 575	x 445	(-) 256,000	x 150	(-) $38,400,000
Edwards	(+) 3050*	(-) 1100*	(+) 1950	x 445	(+) 868,000	x 150	(+) 130,200,000
White Sands (Holloman)	(+) 4094	(-) 750	(+) 3344	x 445	(+) 1,488,080	x 150	(+) 223,212,000
Great Salt Lake Desert	(+) 4300	(-) 2000	(+) 2300	x 445	(+) 1,023,500	x 150	(+) 153,525,000

* Per Data Supplied by North American Rockwell Corporation - Modified to Include Corrected Elevation and Latitude Data

Table 3

Polar Launches

Candidate Launch Sites - Payload Evaluation in Dollars

Site	Design Ref. Mission Payload Effect Per Launch (lb) Elevation	Latitude	Net Gain or Loss	No. of Launches Total Program	△Payload Total Program Lb.	Payload Value Per Lb. $ *	△Value Total Program $ Millions
KSC	Baseline	Not Applicable	Baseline	---	---	---	---
Vandenberg	(+) 500	"	(+) 500	x 445	(+) 222,500	x 150	(+) $33,375,000
Edwards	(+) 3050	"	(+) 3050	x 445	(+) 1,357,250	x 150	(+) 203,587,500
White Sands (Holloman)	(+) 4094	"	(+) 4094	x 445	(+) 1,821,830	x 150	(+) 273,274,500
Great Salt Lake Desert	(+) 4300	"	(+) 4300	x 445	(+) 1,913,500	x 150	(+) 287,025,000

* Figure Supplied by North American Rockwell Corporation

Table 4

Competing Site Comparisons Summary

A number of advantages and disadvantages of various competing shuttle operational sites have been enumerated. To complete our perspective regarding the Great Salt Lake standing in the competition the following assessment is made. Each competing site is assessed in relation to a Great Salt Lake Desert site.

Kennedy Space Center

Advantages

1. Much lower initial cost
2. Able to support NASA missions
3. Political pressure - "People inertia"
4. Proximity to water transportation
5. Sea level elevation for booster return flight and landing

Disadvantages

1. Limited expansion possible
2. Restricted launch azimuths. No south polar launches with foreign country overflight
3. Minimum security
4. Sea level elevation for launches. Higher operational costs
5. Ecological problems
6. Weather

White Sands (Holloman Air Force Base)

Advantages

1. Lower or equal initial cost
2. Natural dry lake available for landings. Has suitable hardness to handle booster
3. Equal elevation for launch plus lower latitude. Low operational cost
4. Availability of natural gas from El Paso Natural Gas Co.

Disadvantages

1. Restricted launch azimuths. No South Polar launches without foreign country overflight.
2. No major repair and maintenance facility nearby

Western Test Range (Vandenberg Air Force Base)

Advantages

1. Relatively low initial cost. It is an active Air Force Test Center.
2. South Polar launches possible.
3. Proximity to water transportation
4. Near sea-level elevation for booster return and landing.

Disadvantages

1. Restricted launch azimuth capability. No easterly launch because of dense surrounding population.
2. Limited expansion
3. Sea level elevation for launches. Higher operational costs.
4. Weather
5. Security
6. No major repair and maintenance facility available.

Edwards Air Force Base

Advantages

1. Somewhat lower cost (not significant).
2. Established as a major Air Force flight test center.
3. Large dry lake available for vehicle landing.
4. Weather

Disadvantages

1. No polar launch capability
2. Proximity to densely populated area
3. High rate of commercial airline over flights
4. May have major Air Force test mission assignment for B-1 and F-15 aircraft.
5. No major repair and maintenance facility available.

In summation, a Great Salt Lake Desert site offers the following advantages over the other potential sites:

1. All axis launch capability. Safe from foreign country overflights.
2. Security
3. Unlimited expansion capability
4. Minimum ecological problems
5. Good weather
6. High elevation launch resulting in lower operational costs.
7. Large area of government owned land
8. Hill Air Force Base support capabilities.
9. Good transportation available in air, rail, truck.

Our major disadvantages are:

1. High initial cost to provide facilities.
2. Height of surrounding mountains.
3. Inland location making delivery of completed vehicles difficult.

10. Good labor pool available
11. Low construction cost.
12. Proximity to urban center.
13. Good industrial support base.

Program Timing

The following is the best estimate of timing that can be made at this time:

Phase B Contractor Study Complete	June 1971
NASA Evaluation of Phase B Complete Site Selected - Phase C Contractor(s) selected	Jan-March 1972
Operational Site Selected	Early 1976
First Horizontal Flight	June 1976
First Manned Orbital Flight	April 1978
Operational	Mid 1979

Conclusions

Hypothesis No. 1

> Utah possesses a site that is uniquely qualified to meet both NASA and Air Force long-range operational requirements.

Utah possesses a site that is uniquely qualified to meet the Air Force requirements. Other sites can meet NASA requirements more easily than can Utah. Even this must be qualified with the assumption that the booster can be given a higher cruise ceiling than presently planned.

Hypothesis No. 2

> The long-range costs to establish a new site in Utah are not significantly higher than at KSC, White Sands, WTR, or Edwards Air Force Base when operational total costs and all mission requirements are considered.

This seems to be a valid hypothesis. However, it may not be sound to assume it will influence the final decision significantly. To locate at a site other than KSC will require significantly higher initial expenditures. NASA does not have the necessary funding in their budget and neither does the Air Force. Other programs are competing for the available dollars and most have higher national priority than the space shuttle. Like one NASA official said, it is easier to get funding to modify an existing facility than to get money to abandon an existing facility and start over again somewhere else -- even if the eventual total cost is higher. Also, the Air Force may prefer to wait in the hopes they can get their own shuttle base.

Hypothesis No. 3

> Congress will support the increased initial costs of a new site if long-range costs can be shown to be lower than alternative plans.

The answer to this is unknown at this time. In any event, a very careful cost analysis would have to be made for Congress and would have to include the time discounted value of expenditures in regard to competing national needs.

Hypothesis No. 4

> Should hypothesis #3 prove invalid and should other non-economic factors dictate selection of KSC for development of the shuttle and for NASA operations, then the Air Force will later need a site for their missions. Criteria for that site only can be met within the Great Salt Lake Desert.

It appears that this hypothesis is sound. KSC will most likely be selected as the NASA shuttle launch site. Utah is the best candidate for an Air Force site.

Therefore, all things considered, KSC will probably be selected as the NASA development shuttle launch site with the strong likelihood that all future NASA missions would be launched from there. Utah should continue to pursue securing the initial site but should not spend large amounts of money to do so. However, a major effort should be made to convince the Air Force that Utah is the ideal spot for an operational shuttle site.

It should be noted that KSC has not yet been visited nor has there been in-depth discussion with Utah's congressional delegation. These will be completed within the next two weeks and may result in a change in these conclusions.

Strategy

- Basic strategy is recommended for consideration as follows:
- Publicly support the space shuttle program.
- Low cost campaign for NASA development site location.
- Hard campaign for operational site location.

Steps to implement this strategy can be as follows:

1. Organize capabilities into task forces:

   a. Political - State and Federal
   b. Economic
   c. Technical

2. Continue to secure background data.

   Learn everything possible about (a) NASA mission plans; (b) Air Force mission plans; (c) KSC development plans.

3. Establish continuing close relationship with key NASA personnel.

4. Establish continuing communication with congressional representatives. Discuss ecological, new town and new transportation concepts as related to shuttle program.

5. Develop detailed reports on specific features or problems related to GSLD as a launching site and in respect to erroneous information published about other sites.

6. Insist through NASA, Air Force, and congressional representatives on factual data being used in any evaluations of GSLD as a launching site.

7. Insist on right to review contractors reports on GSLD and other sites for accuracy.

8. Establish public relations program to govern data released to public.

9. Open communications with Air Force General Sam Phillips.

10. Secure a contract from the Air Force to study GSLD as a potential Air Force shuttle site.

11. Establish a close working relationship with key Air Force personnel and provide series of studies on qualifications of GSLD with or without study contract.

12. Encourage congressional representatives to support Air Force shuttle role.

Above all - Secure a total commitment from all community, government and business leaders to support this program.