Beach Wildrye, *Elymus arenarius*, Sprigging on Shemya Air Force Base, Lateral Clear Zone - A Qualitative Study in Response to Questions Arising From Contract DACA 85-86-C-0042 (Miscellaneous Earthwork and Utilities Repair)

April, 1986

Prepared by:
Alaska Department of Natural Resources
Division of Agriculture
Plant Materials Center
SRB Box 7440
Palmer, Alaska 99645

Submitted by:
Stoney Wright, Alaska Plant Materials Center

Submitted to:
U. S. Army Engineering District, Alaska
Corps of Engineers
P. O. Box 898
Anchorage, Alaska 99506-0898

Date:
16 October 1986

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Introduction

The 1983 clearing and grading of a portion of the Lateral Clear Zone adjacent to the runway at Shemya Air Force Base, on Shemya Island, Alaska, has resulted in massive wind erosion and sand transport. The uniform 10% grade (Figure 1), transportable sand and high winds have combined to cause a major maintenance problem for the Air Force crews assigned to keeping the runway clear. In addition, the Air Force was concerned about the costs associated with clearing the sand and potential mechanical damage to aircraft.

Initial erosion control seedings in 1983 failed. This failure was attributed to late season seeding. The specified seed mix and fertilizer formulation and rates were appropriate and were not questioned.

During 20-24 October 1983, representatives of the Alaska Plant Materials Center (PMC), a section of the Alaska Department of Natural Resources, and the Environmental Resources section of the Alaska District of the U. S. Army Corps of Engineers, were sent to Shemya to determine the best solution to the erosion problem. It was suggested that the area be re-seeded with the same seed mix, sprigged with indigenous Beach Wildrye, Elymus arenarius, and stabilized with excelsior blankets.

Figure 1. Lateral Clear Zone as it appeared in October, 1983. The photographer was facing a northerly direction.

By July, 1985, none of the recommendations had been initiated and the erosion continued. The services of the Alaska Plant Materials Center were requested once again, this time by a direct request from the United States Air Force 5099 CEOS/DEMR. A representative from the PMC was sent on 9-10 July 1985, to Shemya to initiate what became a successful, small-scale Beach Wildrye sprigging program utilizing Shemya Air Force personnel. As a result, the U. S. Air Force insisted that the Corps of Engineers consider Beach Wildrye sprigging as a viable method to control erosion on an additional clearing project being planned for 1987.

A new variable was added to the project; use of chemical soil stabilizers. The effects of these chemicals on newly planted Beach Wildrye sprigs were not known. Therefore, beginning in February, 1986, systematic methods of testing the effects were discussed. The final method selected was an on-site application of Coherex brand and Soil Seal brand soil stabilizers to newly planted sprigs (see Attachment 1 for plan of action).

The original plan was modified after the planting crews arrived on 19 May 1986 (see attachment 2, Trip Report, Fanter, 2 June 1986), because of logistical, scheduling, and construction activities on Shemya.

Methods

See attached Trip Report from Fanter, 2 June 1986.

Results & Discussion

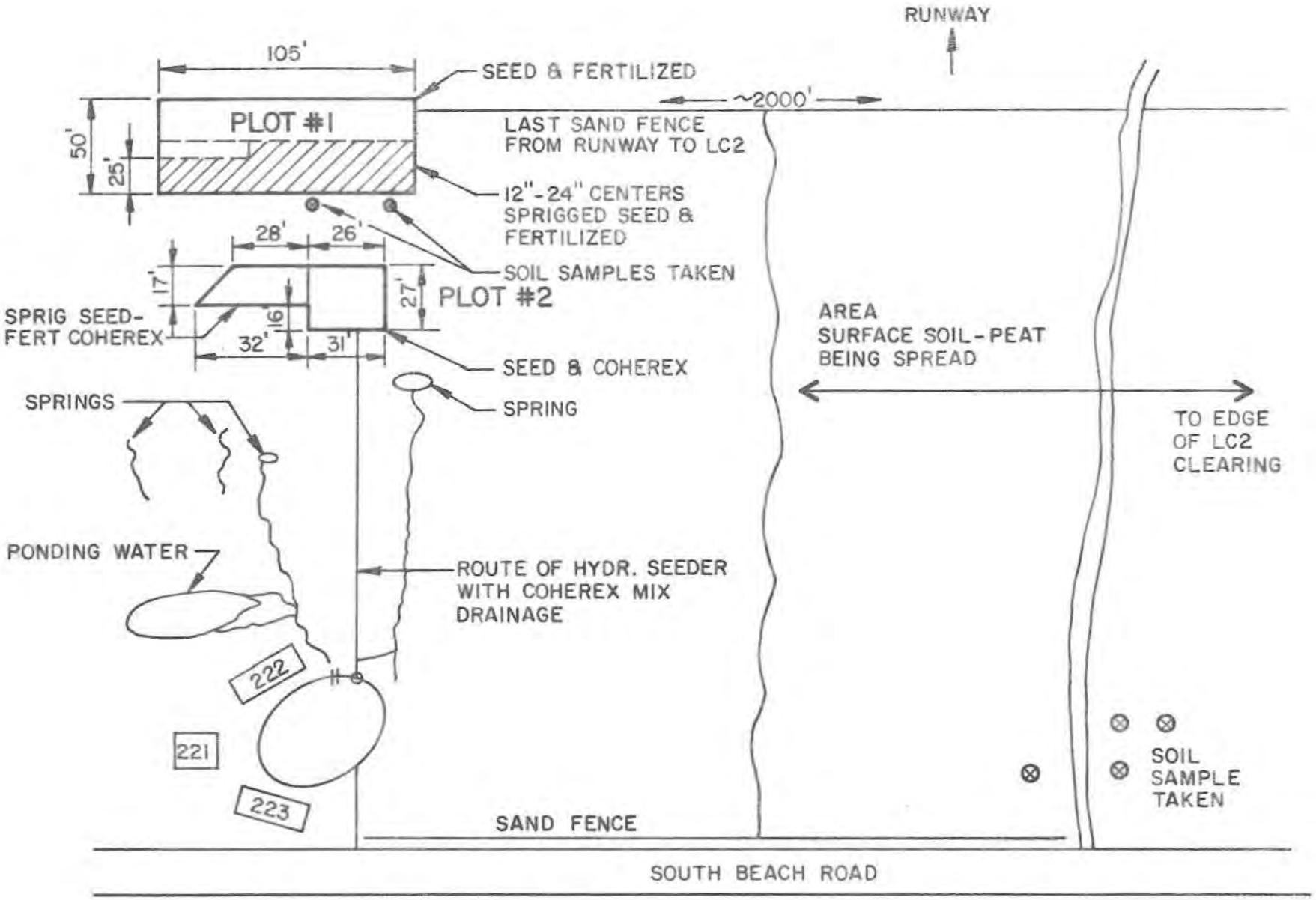
Sprig Establishment at Shemya

The plantings at Shemya consisted of two plots (Figure 2), the intended soil stabilizer-sprayed plot, Plot 1, and the actual Coherex brand-sprayed plot, Plot 2, (Figures 3 & 4 respectively).

All Shemya planting, sprigging and application of Coherex was finished on 22 May 1986.

On 18-19 June 1986, a Corps of Engineers representative visited the plots and reported that the sprigs appeared to be dying and that no grass had grown in Plot 1 (Figure 5).

On 19-20 September 1986, the PMC representative evaluated the results of the plantings. This evaluation indicated a very high survival rate of the Beach Wildrye in the plots. Plot 1 had a survival rate greater than 95% (Figures 6, 7, 8, and 9). Plot 2 had a survival rate of 100% (Figures 10 and 11). The percentages derived from Plot 1, are not based on established transects, but by counting dead sprigs within groups of 100 sprigs within the plot. Plot 2 was sufficiently small that counting all dead sprigs would have been possible; none were found.



STUDY PLOTS-AS ESTABLISHED
SHEMYA, ALASKA

FIGURE 2

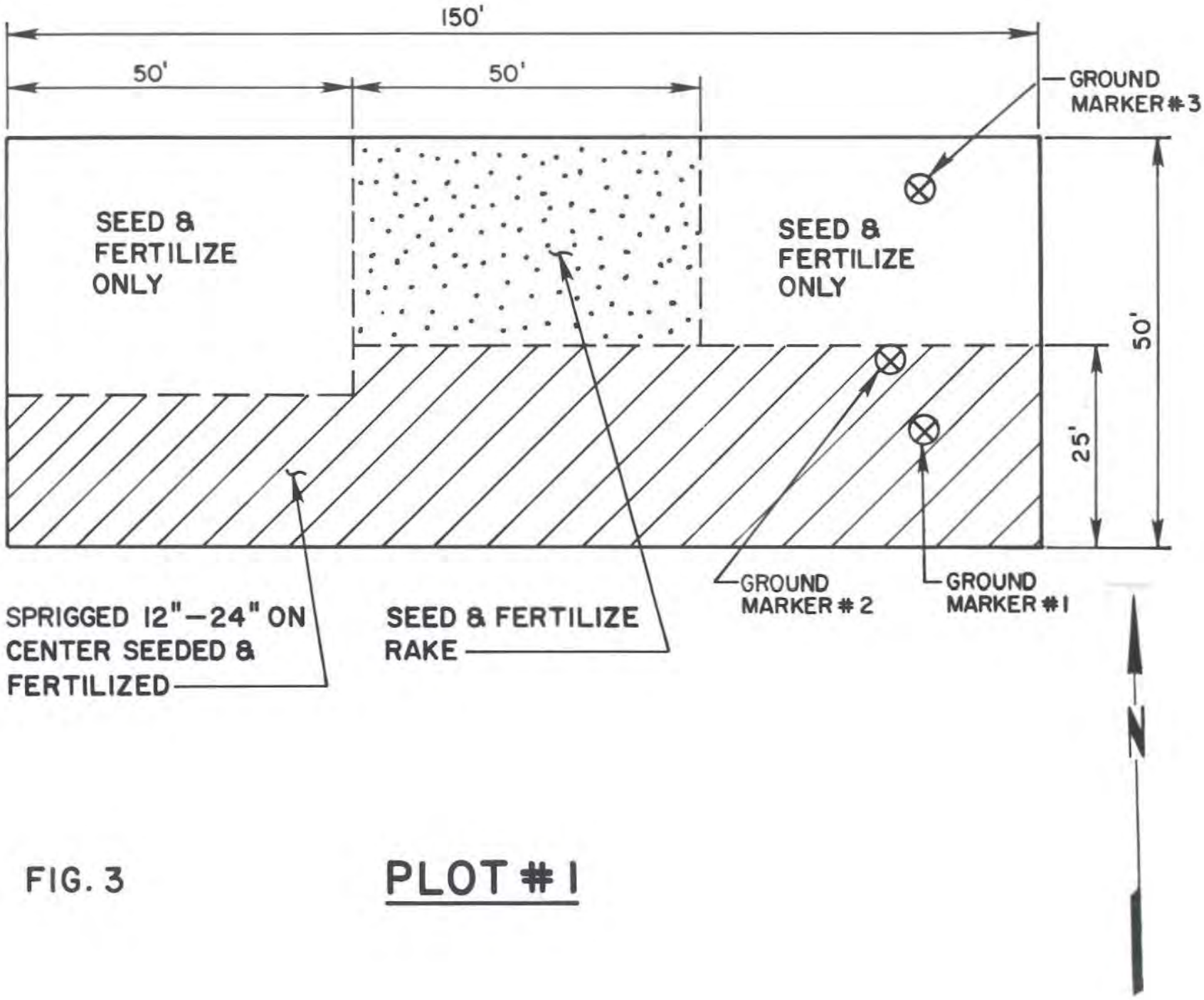

150'
50'
50'
GROUND MARKER #3
SEED & FERTILIZE ONLY
SEED & FERTILIZE ONLY
50'
25'
GROUND MARKER #2
GROUND MARKER #1
SPRIGGED 12"–24" ON CENTER SEEDED & FERTILIZED
SEED & FERTILIZE RAKE
N

FIG. 3

PLOT #1

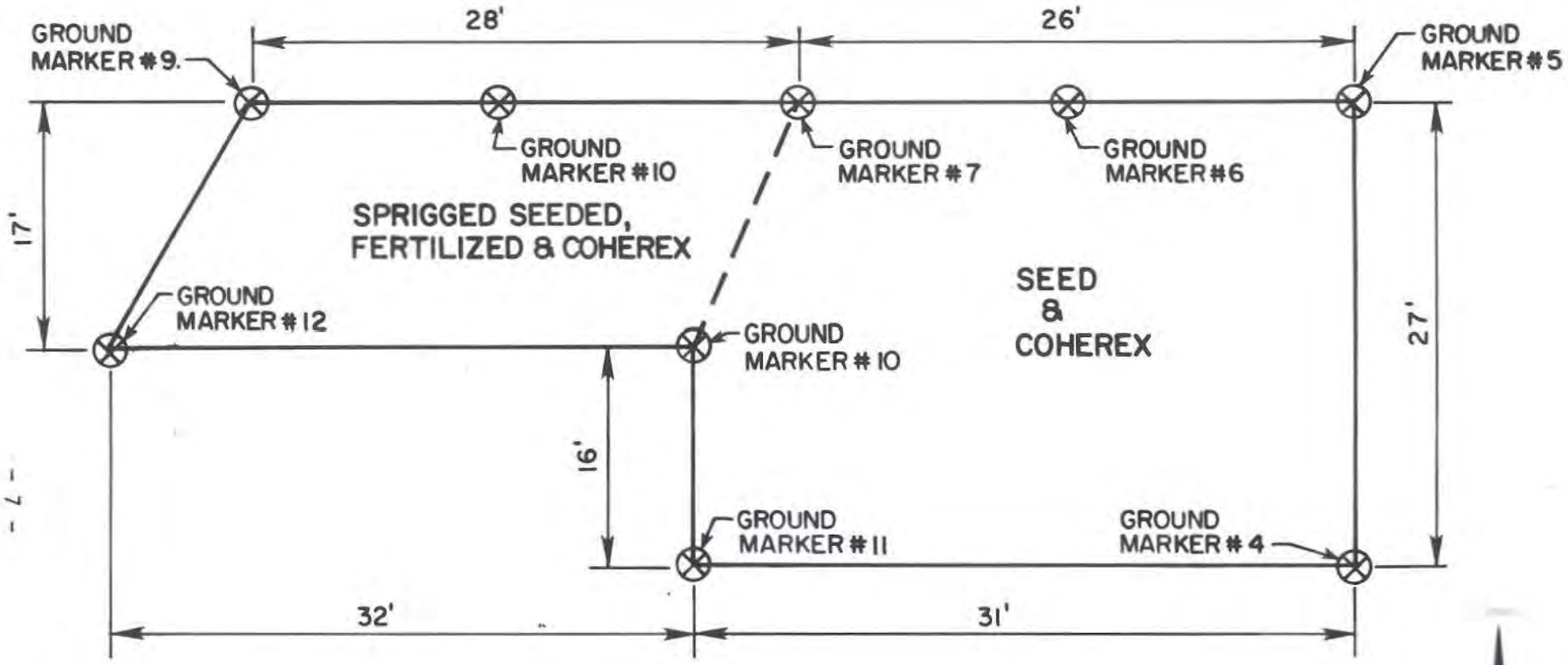

GROUND MARKER #9.
28'
26'
GROUND MARKER #5
GROUND MARKER #10
GROUND MARKER #7
GROUND MARKER #6
17'
SPRIGGED SEEDED, FERTILIZED & COHEREX
SEED & COHEREX
GROUND MARKER #12
GROUND MARKER #10
27'
16'
GROUND MARKER #11
GROUND MARKER #4
32'
31'
N

FIG. 4 **PLOT #2**

Figure 5. Plot 1 as it appeared in June, 1986. Note that the sprigs appear to be dead or dying, and no grass seedlings have emerged.

Figure 6. Plot 1 immediately after planting on 22 May 1986.

Figure 7. Plot 1, looking in approximately the same direction as Figure 6, on 19 September 1986. This plot had a survival rate greater than 95%.

Figure 8. A view from the south edge of Plot 1 looking north. The stand of Beach Wildrye at the top of the photograph became established by itself. The bare area between the two stands, is the area that was only seeded and fertilized and not sprigged.

Figure 9. This photo shows an average sprig density in Plot 1 on 19 September 1986. Note the seedling grasses. The most obvious grasses are Annual Ryegrass, followed by Red Fescue and Hairgrass.

Figure 10. Plot 2 immediately after planting and Coherex treatment on 22 May 1986.

Figure 11. Plot 2 on 19 September 1986. This plot had a 100% survival rate.

Vigor within Plot 1 varied slightly and was rated good to excellent. The Beach Wildrye plants exhibited between 12 and 33 inches of growth (Figure 12). The vigor of plants in Plot 2 was uniformly excellent and plants ranged from 18 to 40 inches tall (Figure 13). This vigor rating was based on comparisons to adjacent three-year old natural stands of Beach Wildrye, which ranged from 30 to 52 inches tall. Established Beach Wildrye sprigs were selected at random within both plots and all exhibited excellent root and rhizome growth.

Seeded Grass Establishment at Shemya

Both Plots 1 and 2 were seeded and fertilized with the seed mix described in the original study plan.

In Plot 1, seedling grasses only appeared in the portion of the plot that had been sprigged (Figures 14 and 15). No seedling grasses were visible in either the raked or unraked portion of the plot that was not sprigged. Both areas had 0% ground cover. The ground cover of seeded grasses within the sprigged area of Plot 1 was roughly estimated at 20%. Vigor was rated fair to good.

In Plot 2, seedlings had become established in both the sprigged and non-sprigged areas. Within the sprigged area, seedling vigor was rated as excellent and the percent cover was estimated at 40% (Figure 16). The seedlings in the unsprigged area (Figure 17) had less than 10 percent cover and a vigor rating of poor to fair.

Figure 12. Close-up of established Beach Wildrye plants in Plot 1 which shows growth that had occurred between 22 May and 19 September 1986.

Figure 13. This photo shows Beach Wildrye plants in Plot 2. There were no signs of damage caused by Coherex.

Figure 14. The portion of Plot 1 (to the left of the sprigs) which was seeded and fertilized only on 21 May 1986 (no sprigs were planted). The dark area in the center is the portion of the plot that had been raked to incorporate the seed.

Figure 15. The same area as in Figure 14 on 20 September 1986. The area that was only seeded and fertilized was a total failure.

Figure 16. Plot 2 shows vigorous Beach Wildrye plants and seedling grasses on 19 September 1986.

Figure 17. Seedling grasses in the unsprigged portion of Plot 2 on 19 September 1986.

Soil Loss and Soil Stabilization

On 22 May 1986, after the plots were established, ground markers were placed in and around the plots so that sand erosion or accretion could be accurately measured (Figures 3 and 4). The sprigged area of Plot I had two markers which showed no soil accretion or erosion when they were measured on 19 September 1986. A third marker within the unsprigged area of Plot 1, showed that 2.5 inches of sand had been eroded. The northeastern corner stake of Plot 1, was laying on the surface suggesting that even more sand had been eroded in that area.

Around the perimeters of Plot 2, nine stakes were marked noting the sand surface on 22 May 1986. On 19 September 1986, markers 4, 5, 7, 8, 10 and 11 indicated that no sand erosion or accretion had occurred. Markers 6 and 9 showed a loss of 1/2 inch, and marker 12, a 1/4 inch loss.

The Coherex soil stabilizer used in Plot 2, appeared to work very well. The area that was not sprigged but received only seed and Coherex, still had distinctly visible footprints and equipment tracks. Outside the Coherex treated area, these markings were gone (Figure 18). Also, the effectiveness of Coherex on sand stabilization was apparent (Figure 19), in the areas where the Hydroseeder had been emptied.

Figure 18. This photo, taken on 19 September 1986, shows equipment tracks and footprints which were made on 21 May 1986 and were preserved by Coherex.

Figure 19. This photo was taken on 20 September 1986 and shows a trail created on 21 May 1986 when the hydroseeder containing Coherex was emptied. Note the perched trail.

Sprig Establishment at Palmer

The logistical and equipment problems that were encountered at Shemya (Trip Report, 2 June 1986), required that the original plan of doing all of the study on-site be modified.

On 22 May 1986, approximately 300 sprigs of Beach Wildrye were harvested, packaged and shipped from Shemya to Palmer. Three plots were planted with 90 sprigs per plot on 23 May 1986. The Soil Seal brand stabilizer and the Coherex brand stabilizer were applied on 28 May 1986 (Figures 20 and 21). One plot was maintained as a control with no stabilizers.

A final evaluation of the Palmer plots occurred on 29 September 1986. The Coherex and Soil Seal plots had a survival rate of 66% and 74% respectively. The control plot had a survival rate of 73%. These percentages do not indicate an important difference. It must be noted that Soil Seal is recommended to be used with an additive, Texanol. This product was not available, and therefore, its effect could not be determined.

The vigor in all the plots was rated good to excellent (Figure 22). The best vigor was observed in the Soil Seal plot and the poorest was found in the Coherex plot.

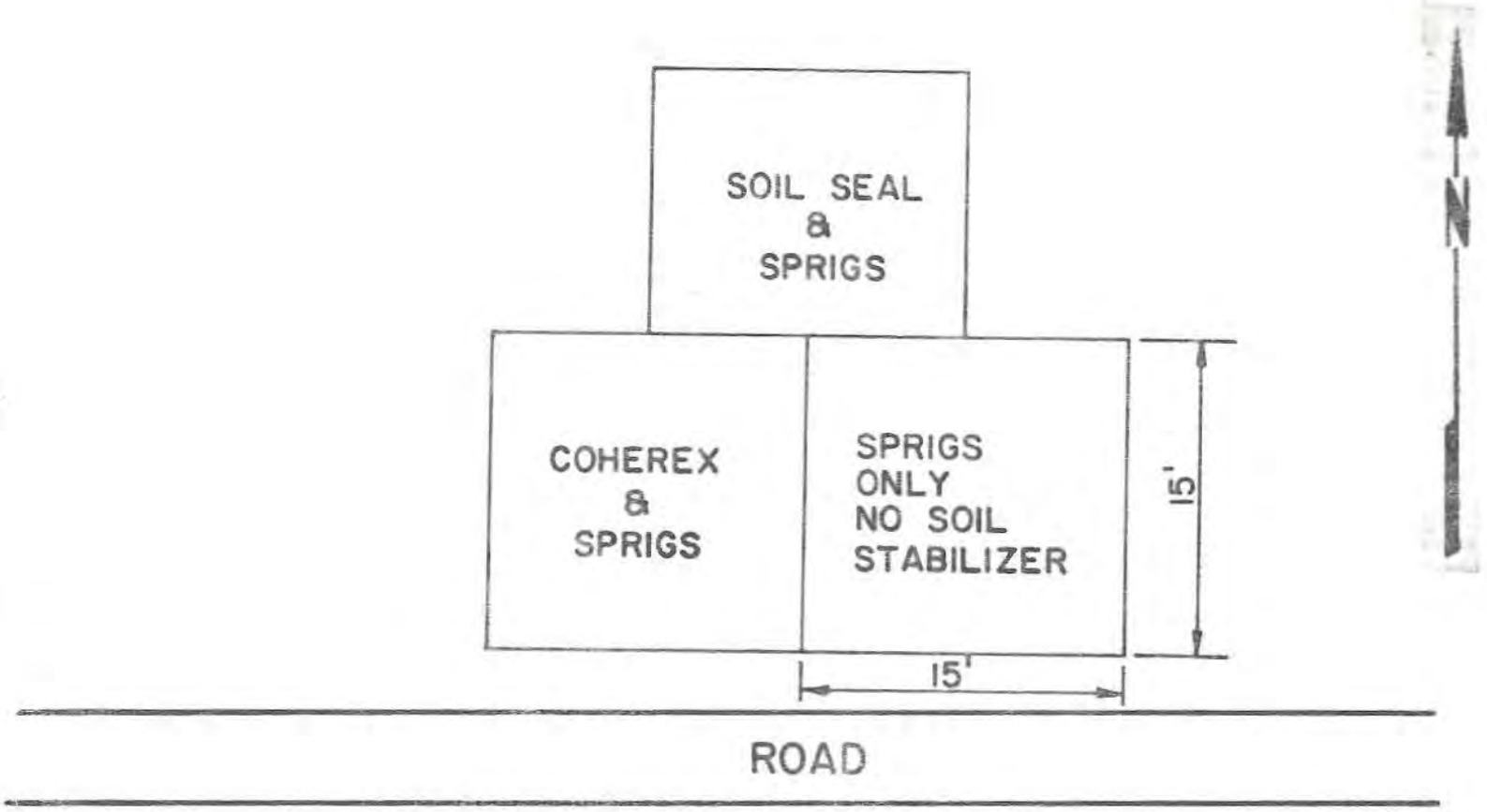


FIG. 20 BEACH WILDRYE PLANTING BLOCKS IN FIELD #4 AT ALASKA PLANT MATERIALS CENTER.
PALMER, ALASKA

Figure 21. Beach Wildrye plots at the Alaska Plant Materials Center, Palmer, Alaska, 29 September 1986.

Figure 22. Close-up of established Beach Wildrye sprigs at Palmer, 29 September 1986.

It should also be noted that the soil at the Plant Materials Center is classified as a silt loam, quite different from the sand at Shemya. Beach Wildrye is a species that prefers sandy soil. Also, the weather at planting was very warm and dry. The plots were irrigated after planting and periodically throughout the establishment period. These factors combined with the dramatic differences in climate between Palmer and Shemya, probably accounted for a portion of the mortality encountered.

In Palmer, the sprigs died back after planting like they did on Shemya. It appeared that the sprigs in all plots had died, but the sprigs recovered within four to five weeks.

Conclusions

This project was intended to answer the following questions:

1. What are the effects of soil stabilizers on sprigs and vegetation establishment and site stabilizations?

2. Evaluate alternative treatments for establishment with comparison to cost, ground cover establishment, and LCZ stabilization.

3. Evaluate the effect of sprigs on sand entrapment.

While all the factors outlined in the initial study plan were not addressed, sufficient work was completed to conclude that:

1. Beach Wildrye can be successfully transplanted and established on the Shemya Air Force Base Lateral Clear Zone.

2. Coherex brand soil stabilizer does not kill or detrimentally affect Beach Wildrye sprigs on Shemya.

3. Coherex brand soil stabilizer does form a protective crust on the sand at Shemya and prevented soil movement.

4. Neither Soil Seal brand, nor Coherex brand soil stabilizer kills or detrimentally affects Beach Wildrye sprigs at the Alaska Plant Materials Center at Palmer, Alaska. There is no reason to believe that Soil Seal will adversely affect Beach Wildrye sprigs on Shemya.

5. Beach Wildrye sprigs, with or without soil stabilizers, provide a high degree of erosion control on Shemya.

6. Based on this study, effective revegetation with grass seed in the Lateral Clear Zone sand, will be extremely difficult without Beach Wildrye as a nurse crop.

7. There did not appear to be important differences in soil loss between the sprigged area with Coherex or without Coherex. It must be remembered that this conclusion is based on two small plots in one location.

8. Beach Wildrye sprigs will die back after planting and initiate new growth in four to five weeks.

The following questions remain unanswered or partially unanswered:

1. Will the Texanol additive be harmful to Beach Wildrye sprigs? Texanol is an additive to be used with Soil Seal when temperatures during application are below 46° F.

2. Will Soil Seal brand soil stabilizer provide equal or better soil protection than Coherex brand soil stabilizer on Shemya?

3. Because of questions 1 and 2 above, should Coherex brand soil stabilizer be the sole recommended product, or should the application of Soil Seal be allowed only at temperatures above 46° F?

4. Is it necessary to use a chemical soil stabilizer for successful establishment of Beach Wildrye? No, but prudence dictates that because of the erosive nature of the Lateral Clear Zone, soil stabilizers will provide effective erosion control in areas where sprig failure may occur and should be used.

5. Is it necessary to seed an area with grass when Beach Wildrye sprigs stabilize the sand so well by themselves? For contract DACA 85-86-C-0042, the answer is yes, because of cover requirements in the specifications. The severe erosion potential of the site also dictates that a combined effort is necessary. For less erosive sites, the question has not been satisfactorily answered.

ATTACHMENTS

Number 1 and Number 2

SHEMYA AFB
EVALUATION PLOTS
GROUND COVER ESTABLISHMENT

GOAL: Establish a ground cover and stabilize the lateral clear zone to minimize/eliminate sand transport to the runway.

OBJECTIVES:

A. Evaluate soil stabilizers (Coherex and Soil Seal) affects on sprigs, vegetation establishment, and site stabilization.

B. Evaluate alternative treatments for establishment with comparison to cost, ground cover establishment, and LCZ stabilization.

B. Evaluate effect of sprigs on sand entrapment.

TASKS:

Task 1: Establish 12 evaluation plots 50 feet by 50 feet (2,500 ft^2, 0.057 acre)

Plot Number	Treatment
1	-Sprig-
2	-Sprig + Coherex + Fertilizer
3	-Sprig + Coherex + Fertilizer + Seed mix
4	Seed Mix + Coherex + Fertilizer
5	Sprig + Fertilizer
6	Seed + Fertilizer
7	Sprig + Fertilizer + Seed mix
8	Fertilizer only
9	Seed mix + Soil Seal + Fertilizer
10	Sprigs + Soil Seal + Fertilizer
11	Sprigs + Soil Seal + Fertilizer + Seed mix
12	Sprigs + Soil Seal

Task 2: Evaluate sprig density for establishment, sand entrapment, and stabilization.

Subplots be established for all sprig plots, uphill half planted 12" to 18" on center, lower half planted 18" to 24" on center.

Task 3: Evaluate supplemental fertilizer application on ground cover establishment.

Approximately six weeks after planting, supplemental fertilizer (14-30-14) to be applied at a rate of 150 lbs. per acre on right half of plots; plots divided left - right, facing runway (uphill).

ATTACHMENT 1

ATTACHMENT 1

Task 4: Evaluate sand stabilization and entrapment.

Use hubs (2"x2"x18") calibrate from ground level at the time of plot establishment and treatment. Monitor sand deposition/displacement and compare among plot treatments.

Task 5: Evaluate following spring (May - June, 1987) fertilizer treatment on plots.

From center point - left to right - parallel to slope; spring treatment 14-30-14 at 300 lbs/ac.

* Method of application depends on crust formation and condition of soil stabilizer, hand versus mechanical.

MATERIALS

Fertilizer	500 lbs.	14-30-14 granular, commercial grade, free-flowing; max 50 lb-bags. 30 lbs/plot application rate/plot If not available at Shemya, need to purchase and ship. Action: NPAEN-PM-AF
Seed Mix	60 lbs.	Bering hairgrass 24 lbs. Boreal, Red fescue 18 lbs. Pennlawn, Red fescue 15 lbs. Annual ryegrass 3 lbs. 60 lbs. 3.5 lbs/plot Action: APMC will provide seed mix
Coherex	175-180 gal.	Applied as a diluted mix--1 part Coherex to 4 parts water--at a rate of 1 gallon/yd^2. 3 treatments plots require 833 gal. mix. Purchase and ship to Shemya or here with arrangements to be shipped to Shemya. Action: NPAEN-PM-AF
Soil Seal	50 gallons	Applied as a diluted mix--1 part Soil Seal to 25 parts water; application rate is 200 gallons of soil seal concentrate per acre. 4 plots require 45.9 gallons + overspray.
Texanol	1 gallon	Must mix 1 gallon Texanol with Soil Seal (50 gallons conc.) to apply at temperature below 46°F. Action: Purchase and arrange shipment to Shemya. NPAEN-PM-AF

Hand-held Cyclone-type Spreaders	4	(e.g., HH-35 Hand-held spreader, cloth/nylon bag, 25-30 lb. capacity $34.15 each). Purchase - NPAEN-PM-AF (Ref. Forestry Suppliers Inc., Jackson; collect 0-601-354-3565 #69037)
Hydroseeder	1	350-gallon capacity; APMC will supply Action: Transport to Shemya, NPAEN-PM-C. (Call Stoney Wright for measurement.)
Hubs	75-100	1"x1"x12"to18" survey stakes Check within District. Ship as excess baggage.

EVALUATION

July 1986

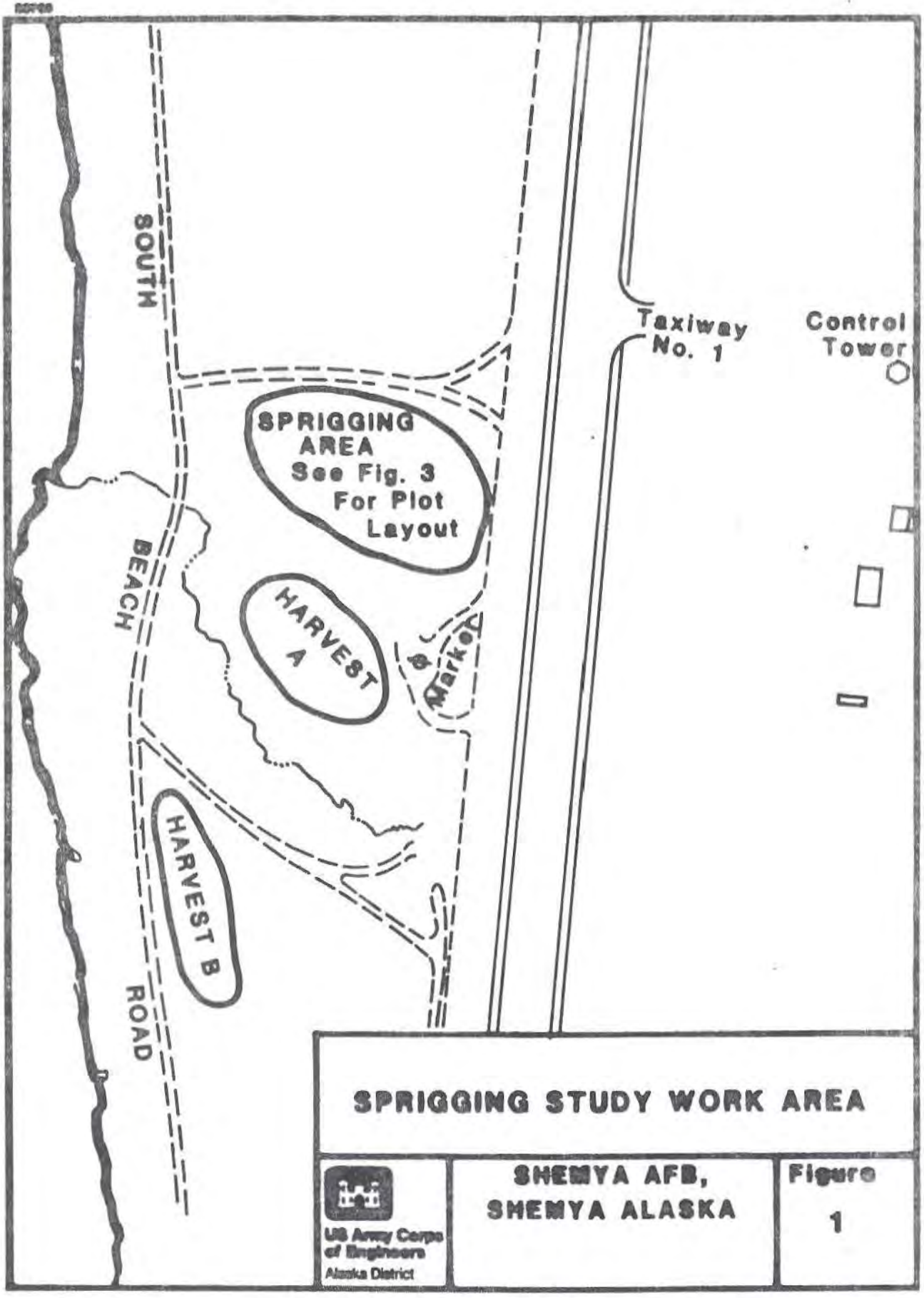
- Supplemental fertilizer application.
- Monitor establishment of ground cover, sand movement, stabilizer crust.
- Field trip - progress report.

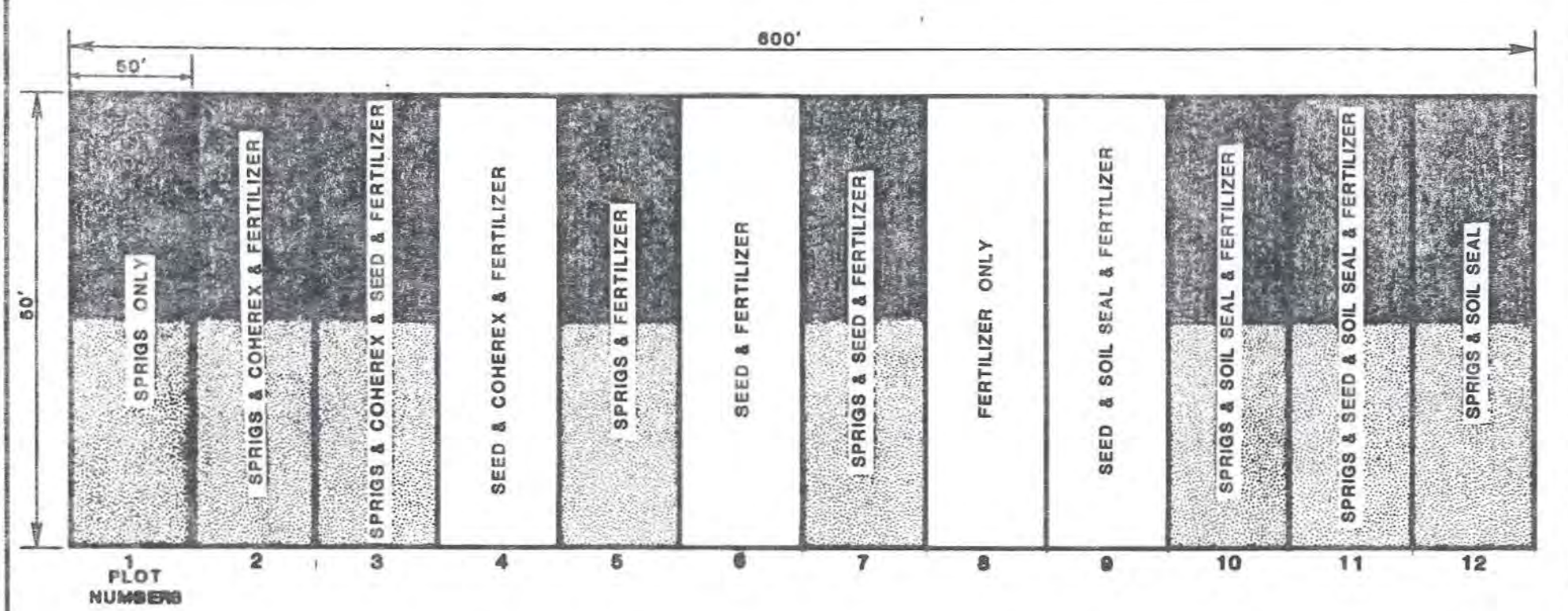
Sept./Oct. 1986

- Monitor establishment of ground cover, sand movement, soil stabilizer.
- Field trip - progress report.

May/June 1987

- Fertilizer application.
- Evaluation.
- Field trip - progress report.


SOUTH
BEACH
ROAD
SPRIGGING
AREA
See Fig. 3
For Plot
Layout
HARVEST
A
HARVEST B
Taxiway
No. 1
Control
Tower
SPRIGGING STUDY WORK AREA
US Army Corps
of Engineers
Alaska District
SHEMYA AFB,
SHEMYA ALASKA
Figure
1



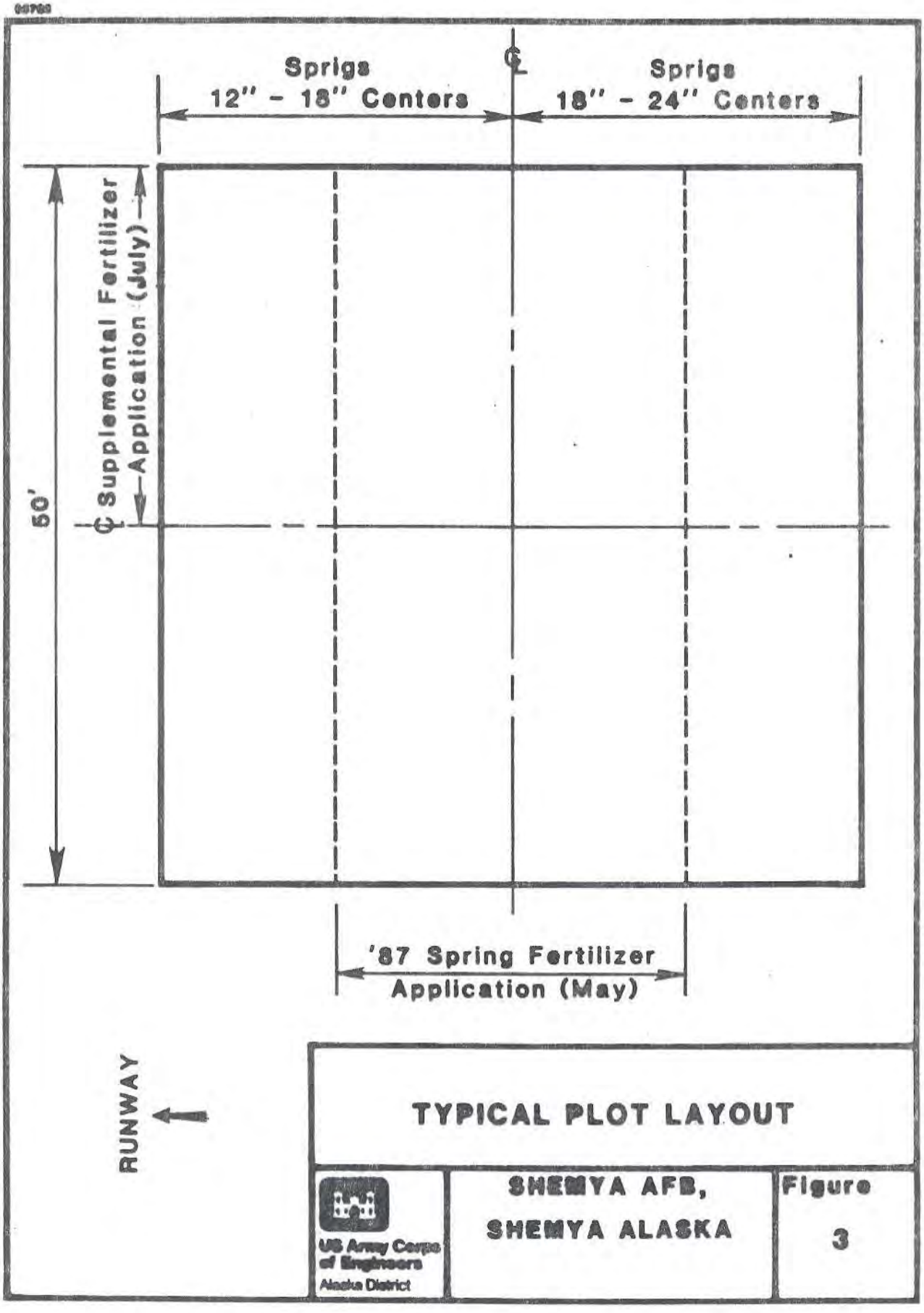
NTS

CONCEPTUAL EVALUATION PLOT SITE LAYOUT

US Army Corps of Engineers Alaska District

SHEMYA AFB, SHEMYA ALASKA

Figure 2


Sprigs
12" - 18" Centers
℄
Sprigs
18" - 24" Centers
50'
℄ Supplemental Fertilizer
Application (July)
'87 Spring Fertilizer
Application (May)
RUNWAY
TYPICAL PLOT LAYOUT
US Army Corps
of Engineers
Alaska District
SHEMYA AFB,
SHEMYA ALASKA
Figure
3

NPAEN-PL-ER 2 June 1986

MEMORANDUM THRU: NPAEN-PL-ER
NPAEN-PL
NPAEN-DB-C
NPAEN

SUBJECT: Trip Report, Ground Cover Establishment, Evaluation Plots, Lateral Clear Zone, Shemya Air Force Base, Shemya Island, Alaska

1. PURPOSE: Primary purpose was to establish study plots to evaluate soil stabilizers' (Coherex and Soil Seal) effects on sprigs, vegetation establishment, and site stabilization. Secondary objectives were to evaluate alternative treatments for establishment with comparision to cost, ground cover establishment, and Lateral Clear Zone (LCZ) stabilization. Description of study plan, including objectives and tasks, is provided as Attachment 1.

2. DATE AND PLACE: 19-23 May 1986, Shemya AFB, Shemya, Alaska.

3. SIGNIFICANT ELEMENTS: The proposed study plan (Attachment 1), as coordinated with Alaska Air Command (AAC-5099th), Alaska Plant Material Center (AMPC) and District Staff, was field adjusted for location and study design. The original location for the study plots was being covered by excavated material (surface soil and peat) from the UPH building. The lack of a front-end loader on Tuesday required harvesting of sprigs by hand. A front-end loader was available Wednesday and Thursday for harvesting. The texanol which was to be added to the soil seal was lost in air freight at Shemya. The texanol additive for the soil seal stabilizer is required for product use below 46°F (high temperature did not exceed 42°F). The APMC's hydroseeder was not shipped as of Wednesday (21 May 1986) although we were informed prior to departure that the hydroseeder was shipped out Friday (16 May 1986). We received word (Wednesday, p.m.) that the hydroseeder may be shipped out Friday or Saturday (24-25 May 1986). Since APMC required their hydroseeder back in Palmer by 30 May 1986, orders to cancel shipment to Shemya were given 21 May 1986. With cooperation from Mr. Greg Wagner (NPACO-RR), a 1500-gallon hydroseeder was borrowed from Shemya Constsruction Company. Unfortunately, the hydroseeder was not fully functional with less than the application rate (1 gallon per square yard of Coherex mix [1 part Coherex: 4 gallons water]) applied to one 15'x20' sprigged plot. At 2130 hours, with 35 knot winds, the contractor's hydroseeder backfiring, a smoking clutch and two operators coated with the Coherex and seed mix, the hydroseeder was shut down and further on-site evaluation terminated.

ATTACHMENT 2

NPAEN-PL-ER 2 June 1986
SUBJECT: Trip Report, Shemya Ground Cover

Four study plots were established: Plot No. 1 sprigged, seed, fertilizer; Plot No. 2 seed and heay Coherex; Plot No. 3 sprigged, seed, fertilizer and Coherex mix; and Plot No. 4 seed and fertilizer (figure 1).

Three hundred sprigs were harvested (22 May 1986) and planted (23 May 1986) at APMC. Soil Seal, and Coherex soil stabilizers were applied to the 15x15-ft. plot on 28 May 1986. The effects of the soil stabilizer on sprigs will be monitored by APMC for 30 days.

From excavation from the UPH site, recommendations for seeding the surface soil/peat within the lateral clear zone were provided to the 5073-ABG.

Ten tree/shrubs were planted within the "Shemya National Forest". Plants were provided by APMC and planted by the 5073d - Heavy Equipment personnel.

4. PERSONS PARTICIPATING:

Stoney Wright	APMC
Nancy Moore	APMC
John Ikeda	NPAEN-DB-C
Lloyd Fanter	NPAEN-PL-ER

Shemya, AFB, 5073d ABG:

Gary Moore, MSgt	5073d/Heavy Equipment
Darren Dirk, SSgt	5073d/Heavy Equipment
Dave Shawholteer, SGT	5073d/Heavy Equipment
Bill Jones, SGT	5073d/Heavy Equipment
John Sorber, AlC	5073d/Heavy Equipment
James Dawson, Amn	5073d/Heavy Equipment
Robert Young, SrA	5073d - DEF
Bradley Morrison, AlC	5073d - SS
Gregory Kemp, Amn	5073d - SP
Shawn Fulton, AlC	2064th - ISS
Site visit - MAJ ~~Izacks~~ IZAACS	5073d Base CE

5. NARRATIVE: Action Items were distributed to District staff on 24 April for advance coordination. On 29 April 1986, a coordination meeting was held (MAJ Irons, 5099th AAC; Stoney Wright, APMC; John Ikeda, NPAEN-DB-C, John Fergunson, NPAEN-PM-AF; and, Lloyd Fanter, NPAEN-PL-ER) to approve the proposed study/evaluation plan and to confirm action items with responsible personnel (Attachment 1). Mr. Ikeda was informed on 16 May 1986 that the hydroseeder was shipped to Shemya, all other materials were at Shemya, and all coordination completed with field staff. Mr. Ikeda relayed this information to Mr. Fanter on 17 May 1986. We arrived at Shemya approximately 1600 hours, 19 May 1986. The Shemya project office was aware that 4 people would be arriving and material would be shipped but had no idea why we were there. At that time we were informed that the hydroseeder was not shipped, and the texanal additive for the soil seal was lost. (Texanol is required with the use of soil seal below 46°F.) Upon coordinating with the field office, we checked in with MSgt G. Moore, 5073d. MSgt Moore, likewise received word by telephone message that 4 people would be arriving but had not been informed of our study plan, heavy equipment needs, etc. We presented MSgt Moore with a copy of our plans. Upon review of the plans, MSgt Moore asked us if we had been to our proposed site. We said no, we had just gotten in. He suggested that we may want to revise our plans since proposed sprigging area (primary and 2 alternate sites) were being covered with excavation material from the UPH (Unaccompanied Personnel Housing) building construction. MSgt Moore informed us that his front-end loaders were down for repair, but he would see what he could do. At 2030 hours, a revised study plan was completed with an alternate site west of proposed location (Figure 2).

Day 2 - Plots were staked out, five "volunteers" were provided by MSgt Moore, the front-end loaders were still down for repairs but a wide track dozer was provided to provide an access road to the site for the hydroseeder and plot establishment. Since a loader was not available, beach grass sprigs were harvested by hand. Measured harvest rate for seven people for 30 minutes was about 800 plants. Upon coordination with the District, we were informed that the hydroseeder would be shipped Wednesday 21 May 1986. A front-end loader was available for the evening shift. Three volunteers (including operator) harvested over 800 sprigs in 30 minutes. Harvesting and planting continued to 2030 hours.

Day 3 - Sprig harvesting and planting continued. We informed that the hydroseeder would not be shipped today, possibly to ship on Friday or Saturday, one to two days after our scheduled departure. Since the hydroseeder was delivered to the District and ready for shipment on

9 May 1986, and advance coordination for the paper was conducted in April, APMC could not take chances on having their hydroseeder tied up any longer and orders to cancel the shipment were given. Through the cooperation of Mr. Wagner, Shemya project officer (NPACO-RR), a 1500-gallon capacity hydroseeder (only one on the island) was borrowed from Shemya Construction Company, and mounted on a 10cy dumptruck. Two hundred gallons of Coherex was mixed with 800 gallons of water and 60 pounds of seed mix. The hydroseeder/tract was towed to about one hundred feet below the study plots within the sand area of the LCZ. With 25 to 35 knot winds (down wind of the study plots) we knew now we were going to get some backspray, but with the large hydroseeder (over 100hp) we should be able to reach the plots. Unfortunately the hydroseeder was not fully functional (either inadequate cleaning of the pump pipes or poor clutch); needless to say, operater Stoney Wright and assistant Lloyd Fanter were drenched with the Coherex mix as it shot out about 30 feet and drifted back (Material Safety Data Sheet attached). A second sprigged plot approximately 15 x 30 feet was established adjacent to the truck/seeder. One 5 to 10 second burst of Coherex was applied to the plot before the clutch started smoking and engine backfiring. Rather than chance damage to the contractor's equipment, the hydroseeder was shut down and the contents drained as it drove back to the road. One plot was established with the drain area. As per Witco Co., Material Safety Data Sheets, both operators took 30 minute showers. The hydroseeder was cleaned by the 5073d/Heavy Equipment people and Mr. Wagner was informed of the not fully functional contractor hydroseeder. Further Shemya on-site testing was terminated.

6. SOIL STABILIZER AND SPRIGGING TESTING: On Thursday (22 May 1986) 300 sprigs were harvested for transport to APMC, Palmer. Sprigs were planted on 23 May 1986. However, temperatures were between 60°-65°F when planted in Palmer. This may affect survivability according to other studies where temperatures over 55°F resulted in higher mortalities. Three plots were established 15 by 15 feet with 100 sprigs planted per plot at 18-inch centers. Soil Seal and Coherex were applied to the plots on 28 May 1986. One gallon of Soil Seal concentrate mixed in about 50 gallons of water and 5 gallons of Coherex per 50 gallons of water was applied by hydroseeder. Although the dilution rate was higher than recommended, the amounts of active ingredients per plot were equal to the recommended rate. APMC will monitor the plots.

7. SEED RECOMMENDATION: Recommendation to the 5073d ABG for grass establishment of surface soil/peat covered section of the LCZ consisted of an application rate of 60 lbs. per acre of:

bering hairgrass - norcoast	24 lbs/acre
red fescue - boreal	18 lbs/acre
red fescue - pennlawn	15 lbs/acre
annual ryegrass	3 lbs/acre

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Advised SGT Ray (5073d) that the hairgrass was in limited supply, and if they could get it, to increase the red fescue - boreal by 24 lbs/acre. Application rate can be exceeded but do not exceed 90 lbs/acre with respective percent mixture.

A 14-30-14 fertilizer was recommended at an application of 500 lbs/acre. SGT Ray asked if a 21-11-11 application could be substituted, since it is available under their supply requisitions. There should be no problem in substitution.

We, Wright and Fanter, recommended that if grass establishment is going to have a chance, they need to complete planting within the next three weeks. They will start planting next week by drill seed methods. We concured that a short term, one to two year, solution to stabilizing the sand within the LCZ may be possible with suface soil/peat coverage and grass establishment, but we have questions on longer term control when as the peat dries out and is loaded with sand. They may want to try strip (50 feet wide) sprigging near the south end for additional sand entrapment. We wish them luck.

8. SOIL SAMPLES: Soil samples were collected at the study plots, harvest area (further FY 87 clear zone work) and surface soil/peat area. Sample submitted to NPAEN-FM for sieve analysis, percent organics and pH, and also to APMC for nutrient analysis, pH and organic content.

9. Site pictures are currently being developed and printed, and will be add to the MFR.

10. The "coordinated" study effort was inadequately completed. I believe that it would be appropriate for NPAEN-PM-AF to provide a letter of appology at least to the APMC for tying up their hydroseeder for over 4 weeks (3 weeks since delivery and 1 week ready for shipment waiting for coordination/direction from NPAEN-PM-C), and the additional work caused by the inadequate coordination. The reason we proceeded as far as we did was by the involvement of the 5073d/Heavy Equipment group, their versatility and capability of getting a job done well with little coordination and short notice. The Shemya project office was also helpful, and the long hours spent by Mr. Wright and Mr. Moore, APMC and John Ikeda (NPAEN-DB-C) should be acknowledged.

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LLOYD H. FANTER
Biologist, Environmental
Resources Section

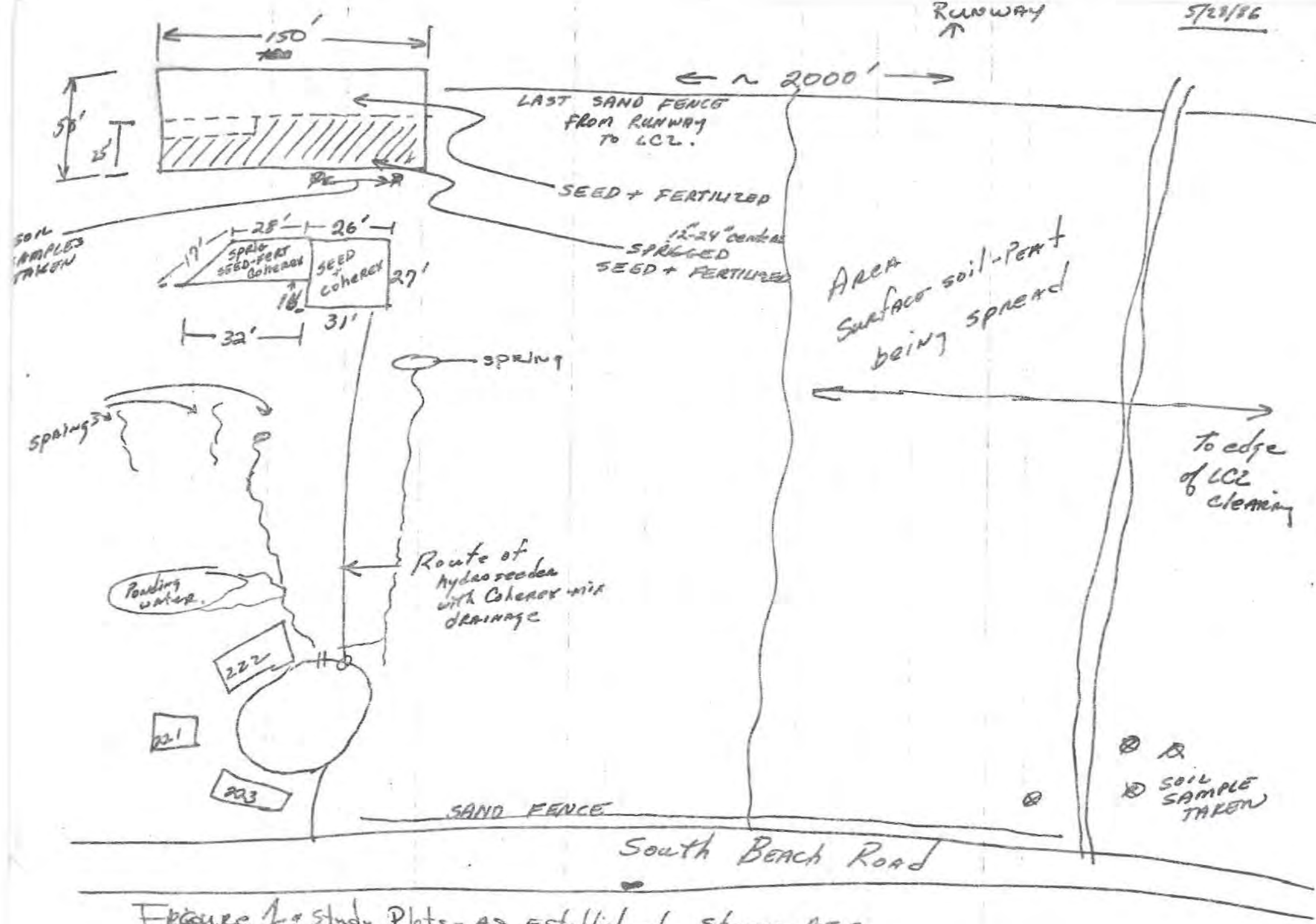
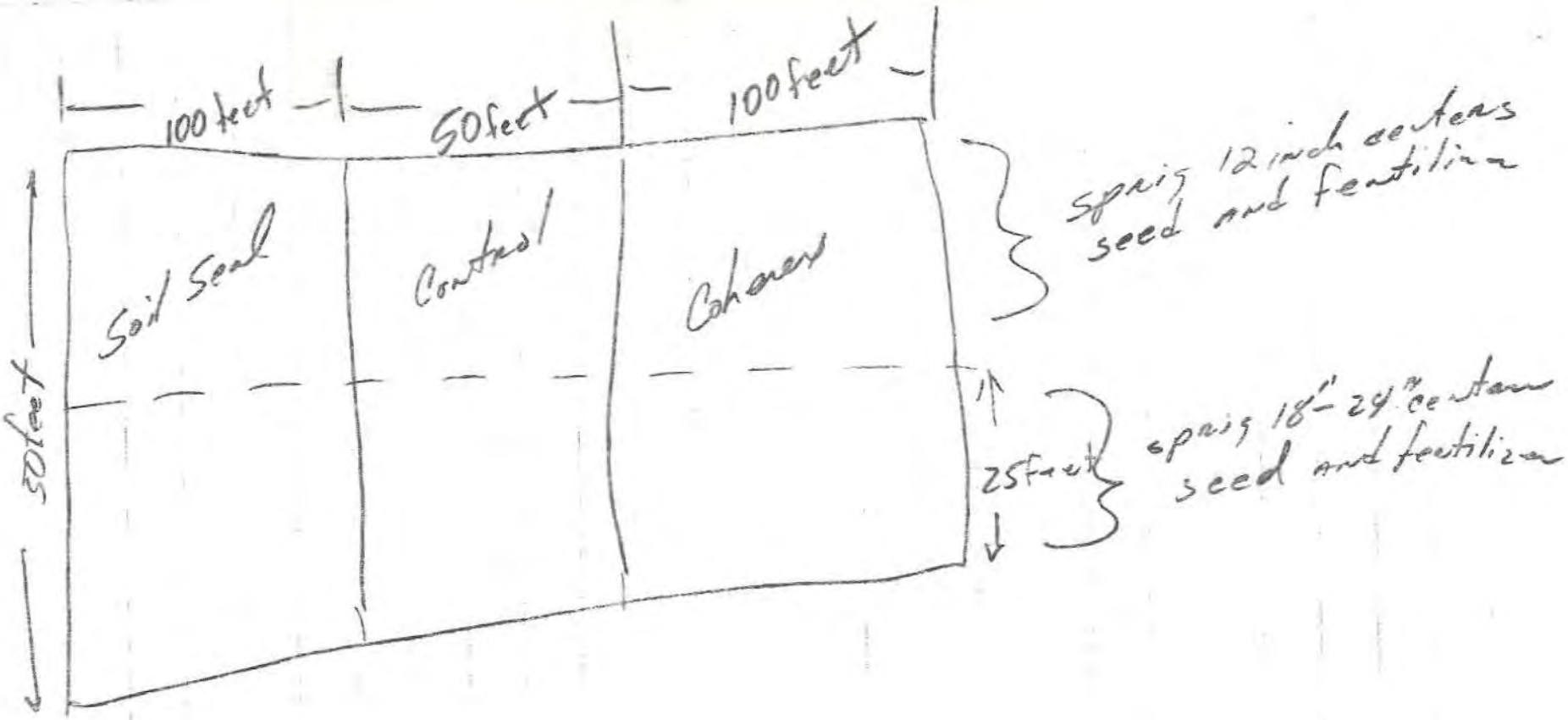


Figure 1. Study Plots - As established, Shemya AFB



Proposed revision of study plot design 5/19/86
(not used further revised)