Bureau of Mineral Resources, Geology & Geophysics

R E C O R D

BMR RECORD 1992/29

SEISMIC DATA PROCESSING REPORT

FOR

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
MARINE GEOSCIENCE AND PETROLEUM GEOLOGY GROUP

BONAPARTE BASIN SEISMIC SURVEY 1991

BMR SURVEY 100

by

DIGITAL EXPLORATION LTD
(A DIGICON COMPANY)

1992/29
c.4

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T.C. GOH : Marine Processing Supervisor

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1.0 INTRODUCTION

This report presents an account of the processing sequence and techniques used for processing seismic data in the Bonaparte Basin for Bureau of Mineral Resources, Geology and Geophysics, Division of Marine Geoscience and Petroleum Geology.

A total of 2214.350 kms of marine seismic data was processed by Digital Exploration Ltd, Brisbane during the period from July 1991 to December 1991.

Client supervision was provided by Mr. Frank Brassil and Mr. Tim Barton.

Details of the field data acquisition parameters and processing sequence are given in Sections 2 and 3 respectively.

Listing of line numbers with SPN ranges, kilometre indexes and TIME is given in appendix 5.1, archive tape listing in appendix 5.2 and location map in appendix 5.3.

2.0 FIELD DATA ACQUISITION

The data was recorded by BMR between 9 April 1991 and 2 May 1991. A brief summary of the acquisition parameters is as follows :

Vessel	: R/V "Rig Seismic"
Source	: 2 x 1500 cu.in. airguns
Source depth	: 10 m.
Shot spacing	: 50 m.
Shot interval	: 21.60 sec at 4.5 knots 19.44 sec at 5.0 knots (lines 007 and 200)
Streamer type	: Fjord instruments transformerless
Streamer length	: 4800 m.
Streamer depth	: 10 m.
Group interval	: 25 m.
Number of channels	: 192
Recording fold	: 48
Near offset	: 163.2 m. or 168.2 m.
Recording length	: 16 sec.
Sample rate	: 4 ms.
Tape format	: SEG-Y, 6250 bpi
Polarity	: SEG normal

Distance from antenna to source centre : 83 m.

for line 200, the following recording parameters are different :

Streamer length	: 3600 m.
Number of channels	: 144
Recording fold	: 36
Recording length	: 15 sec.
Sample rate	: 2 ms.

3.0 PROCESSING SEQUENCE

A brief description of the processes used in the processing sequence is as follows :

3.1 TRANSCRIPTION

The field data recorded in BMR 16 bit floating point SEG-Y were transcribed and converted to DISCO format.
The output was to 16 seconds at 4 msec. sample rate.

3.2 TRUE AMPLITUDE RECOVERY

The process of true amplitude recovery consists of the correction for amplitude losses due to the spherical spreading of the wavefront as it passes downward through the earth and is reflected back to the surface was made. This is also a non-linear function with time or depth. Thus, as the amplitude of the recorded trace varies inversely with the radius of the advancing wavefront, each trace was multiplied by a function 'VT/2', where V is the seismic wave velocity and T is the two-way time.

The Velocity/Time function used for the spherical divergence correction was:-

Time (ms)	Velocity (m/s)
0	1500
250	1500
500	1700
1000	2100
1500	2500
2000	2800
4000	3800
6000	4500

3.3 SHOT DOMAIN VELOCITY FILTER

When a two-dimensional fourier transform is applied to a seismic record, it is transformed from the time-offset (T-X) domain to the frequency-wavenumber (F-K) domain.

Seismic events in the T-X domain map to events radiating from the origin in the F-K domain and reach the wavenumber "alias frequency" at a frequency given by the relationship alias frequency = 500/dip (where "dip" is the dip, in milliseconds per trace, of the event in the T-X domain).

Some coherent noise trains which appear at various times on the shot records can be isolated to some extent in the F-K domain.

In this data the main difference between the seismic signal and noise was one of apparent dip. Once the location of the noise in the F-K domain was established it was muted out prior to reverse transformation into the T-X domain for subsequent processing. For this data, an F-K filter was designed to preserve data in the dip range of -8.33 ms/trace (-3.00 km/sec) to +11.1 ms/trace (+2.25 km/sec) in the T-X domain.

3.4 2:1 ADJACENT TRACE SUM

2:1 Adjacent trace sum was achieved with a partial moveout compensation using an average velocity.

3.5 PREDICTIVE DECONVOLUTION

Digicon's DECONA module uses the Wiener-Levinson algorithm to design filters which effectively extract the predictable signal from the total data spectrum. This alogrithm assumes the input wavelets are minimum phase, the input reflectivity spectrum is white and the wavelet is stationary across the inverse filter design window.

The objectives of predictive deconvolution are two fold and described as follows :

1a SPIKING MODE

In spiking mode (gap of one sample) the data's amplitude spectrum is whitened from 0Hz through to the Nyquist frequency. A percentage white noise is added to the spectrum prior to inverse operator design to maintain stability. A value of 1% white noise is considered normal, however the effective whitening is inversely proportional to the percentage of noise added.

1b GAP MODE

A gap deconvolution operator will reduce the whitening effect of the deconvolution operator. The gap length can be taken as the second zero crossing from the peak value on the data's autocorrelation function thus avoiding changing the input wavelet's phase.

2 MULTIPLE ATTENUATION

The operator length is selected after studying the autocorrelation function. The combined length of the gap plus operator will attenuate multiple energy upto that period.

For this project the selected parameters where :

White Noise Percentage : 0.1%

Gap Lengths : 12 msec, 36 msec, and 48 msec

Operator Length : 400 msec.

Number of Design Gates : 3

Design Gates	near offset	far offset
[1]	0 - 4000 ms	3600 - 5500 ms
[2]	3400 - 9000 ms	5000 - 11000 ms
[3]	8000 - 13000 ms	10000 - 14000 ms

Application Gates	near offset	far offset
[1]	0 - 2000 ms	0 - 4550 ms
[2]	4000 - 8000 ms	5500 - 10000 ms
[3]	10500 - 16000 ms	12000 - 16000 ms

3.6 STATIC CORRECTIONS

Static corrections of -81.00 ms for gun and recording delays, +13.33 ms for source/streamer corrections were applied, thus referencing the data to mean sea level.

3.7 COMMON DEPTH POINT [CDP] GATHER

In this process the seismic traces along a line are sorted into a primary key sequence on the basis of common-depth-point and a secondary key of increasing offset distance within each 'CDP' group. For this project the data were gathered into common-mid-points with a fold (number of traces per CDP) of 48 and a CDP interval of 25 meters.

3.8 VELOCITY ANALYSIS [FIRST PASS]

VELFAN Discrete Velocity Analysis is a comprehensive velocity determination package. At each velocity analysis location the CDP gather records are normal move-out corrected with a range of velocities specified by the user. These gathers are then summed to observe the stack response. The module provides a display of the selected velocity control depth points showing :-

1. central CDP gather before correction for normal move-out.

2. normal move-out corrected central CDP gathers associated with their respective velocity fan functions.

3. display of the stack associated with the suite of selected velocity fan functions.

A semblance function is computed across the stacked panels and

displayed in graphical form for user reference. Based on the semblance values the program provides optional time-velocity picks which are displayed as a numerical listing and also imposed on the velocity time graph, which is positioned to the right of the actual data. Offset information displayed above each gather trace can be used to determine the required prestack mute pattern. The mute pattern used for the analysis is displayed on each normal move-out corrected gather record The above analyses were conducted at 2 km interval over 21 CDP with 11 velocity functions.

3.9 DIP MOVEOUT CORRECTION [DMO]

The data was processed through Digicon's DIPCOGLX F-k domain Dip moveout routine which utilizes a logarithmic transformation of the time axis such that the DMO operator remains temporally stationary as well as spatially stationary. The impulse response of the DIPCOGLX operator has been shown to be comparable to Hale's published algorithm. For further details refer to " Dip moveout in the frequency-wavenumber domain " GEOPHYSICS VOL 52, No 12 (Dec 1987) pp 1718-1721.

The main benefits of including DMO in the processing sequence are :-

1. Dip-independent stacking velocities

Stacking velocities after DMO are dip-independent, allowing both horizontal and dipping reflectors to be stacked with the same RMS velocity ie. the RMS velocity associated with the horizontal event. Thus flat dip primary reflectors and steep dip events (such as fault plane reflections and diffraction limbs) may be optimally stacked at the same time.

2. Removal of reflection point smear

Data recorded at a finite offset is transformed to zero offset thus eliminating reflection point smear. Time varying multi-channel filters applied in the common-offset domain laterally shift the reflection points to their zero-offset position.

Prior to DMO the common depth point data were compressed from OFOLD fold to NFOLD fold using a residual moveout correction and subsequent common offset summation. This effectively increased the signal to noise level and ensured a series of common offsets for the partial migration process. It was noted that the fault plane reflections and diffraction events were enhanced on the DMO stack.

3.10 VELOCITY ANALYSIS [POST DMO]

A second pass of velocity analyses were done on DMO gathers with ZMULT application at 2 km interval over 21 CDPs and 11 velocity functions using Digicon's "VELFAN" routine.

3.11 NORMAL MOVEOUT CORRECTION

The stacking velocity functions derived from the final velocity

analysis are used to compute the normal moveout [NMO] corrections
to be applied to the traces in the final CDP gathers.

The NMO is performed assuming that the energy travels in a straight raypath and utilizes the following equation :

TT = (T0**2 + (X**2/V**2)) **0.5

where

TT = Total recorded travel time in seconds

X = Offset

T0 = Time of reflector at zero offset in seconds

V = RMS velocity

**N = raise to the power N

Velocity-time knee points are honoured on adjacent control points prior to interpolation of the temporal velocity field. Then the space variant velocity function is derived by linear interpolation between control points.

3.12 PRE-STACK MUTE

A front-end mute (or ramp) is applied to the shallow and far offset data to remove any undesirable, excess stretching after NMO application. As the start time of the mute is from zero time it will also remove non-compressional background noise recorded above the first breaks. The mute pattern is either determined from comparative prestack mute tests or from NMO corrected gathers.

The mute pattern applied to this project is described below:

Offset(m.)	Time(msec.)
280	0
400	400
4950	3800

An inner trace mute is also applied to the data prior to stacking.

Offset(m.)	Time(msec.)
160	1500 - 8000
710	3000 - 6000

3.13 COMMON DEPTH POINT STACK

Stack is the summation of traces within each CDP producing a single stacked trace for each input gather record. The stack is normalised and mute zone compensated to account for the smaller number of live traces in the mute zone and for uneven fold of coverage. The data was recorded with a nominal fold of 48.

3.14 MIGRATION

Seismic stack sections are representations of complex wave fields. Migration is the process which is used to simplify this representation. In general the fundamental effects of migration are :

a) Lateral displacement of dipping events to their correct locations.

b) Collapsing of diffraction patterns to their associated point source origins.

c) Reconstruction of buried foci.

d) Improvement of major and minor fault delineations.

e) Signal-to-noise improvements for coherent events in areas where most of the noise consists of diffraction arrivals.

All data were migrated using FK method with 90% smoothed final stacking velocity field.

3.15 SPECTRAL EQUALIZATION

Desired output bandwidths are given as follows for different times :

time(secs)	passband(hz,db/oct)
0.0	3/8 - 60/72
1.0	3/8 - 50/60
2.0	3/8 - 45/48
4.0	3/8 - 40/48
6.0	3/8 - 30/36
10.0	3/8 - 20/36
16.0	3/8 - 20/36

3.16 SIGNAL ENHANCEMENT

This advanced processing technique performs in the Tau-p domain, where p represents slowness (inverse velocity in microseconds per meter) and tau is the zero offset intercept time. The objective is to improve on the input data's signal-to-noise level. The routine has two distinct phases :

1. TAU-P TRANSFORM

Local Tau-p transforms are made across overlapping panels of stacked data. By retaining data upto certain p-traces coherent noise events lying on higher p-traces will be rejected. Note that a given p-trace will contain only energy of a certain dip so the above procedure is acting like a dip filter.

2. SEMBLANCE

A semblance map of the Tau-p domain plane is used to enhance non-linear coherent energy by rejecting values below a certain coherency value.

Tau-p filtering (using the coherency option) was performed using a transform length of 41 traces enhancing data events within +/- 6 msec/trace.

3.17 TIME VARIANT FILTER

Application of a time variant filter will remove unwanted noise that lies outside the frequency range of the desired reflection and diffraction data. The stacked data were filtered with a series of zero phase bandpass filters. These following filters were selected from a series of filter test panels:

time(secs)	passband(hz,db/oct)
0.0 - 0.5	5/18 - 70/72
1.0	5/18 - 60/72
2.0	5/18 - 55/60
4.0	5/18 - 50/48
6.0	5/18 - 40/48
10.0 - 16.0	5/18 - 30/48

3.18 TIME VARIANT SCALING

For display purpose, a AGC of 500 ms gate length was used on all final displays.

3.19 2:1 TRACE SUMMATION

Adjacent traces were vertically summed to achieve a horizontal scale of 1:50,000 and 9.84 traces/cm.

3.20 FINAL DISPLAYS

The following final displays were produced on paper :

1. 0 - 7 sec RAW stack
2. 0 - 14 sec RAW stack with 2 trace sum
3. 0 - 7 sec SPEQ/TP stack
4. 0 - 14 sec SPEQ/TP stack with 2 trace sum
5. 0 - 7 sec migrated stack
6. 0 - 14 sec migration stack with 2 trace sum
7. 0 - 7 sec migrated (SPEQ/TP) stack
8. 0 - 14 sec migrated (SPEQ/TP) stack with 2 trace sum

		0 - 7 sec section	(2 trace sum) 0 - 14 sec section
Horizontal scale	:	9.84 traces/cm (1:25,000)	9.84 traces/cm (1:50,000)
Vertical scale	:	10 cm/sec	5 cm/sec

Stacking velocity functions were annotated above the data section. A sidelabel display gives details of the processing sequence.

4.0 DATA PROCESSING SYSTEM

Digicon's installation in Brisbane is based on two Digital Equipment Corporation's VAX 8650's computers A brief description of the computers and peripheral devices is as follows :-

Main processing system		VAX 1	VAX 2
1) Computer system	:	8650	8650
	:	32 bit central processing unit with total of 32 remote input/output terminals allowing multi-user, multi-functional interactive capability.	
capacity (virtual memory)	:	32 MB	32 MB
operating system	:	DISCO	DISCO
2) Array processors (FPS 100)	:	4 units	4 units
Array processors (NMX 432) (High performance floating point array processor)	:	2 units	1 unit
3) Disk storage system	:	3 units	3 units
capacity (each unit)	:	1.23 GB	1.23 GB
4) Magnetic tape drives	:	15 units	14 units
density	:	800 bpi, 1600 bpi and 6250 bpi	
5) Line printer	:	1 unit	1 unit
6) Display system	:	BENSON/VERSATEC Electrostatic plotters. (Resolution: 200 dots/inch) 2 units 36" plotter 1 unit 22" plotter	
	:	1 unit GEOSPACE FILM PLOTTER (Resolution : 508 dots/inch)	

7) Digitiser : 2 units summagraphic digitising tables

- 1 unit TEKTRONIX graphics terminal and one hard copy unit
- 1 unit off-line ammonia printer
- 1 unit SUN SPARC workstation

The DISCO system (Digicon's interactive seismic computer) is an extension of the Digicon's modular seismic data processing developed over many years. Being modular, the system is completely flexible allowing complete user control of the number and sequence of operations performed in any job. The DISCO seismic monitor assembles the selected modules in the specified order and controls the processing run.

Respectfully submitted,
Digital Exploration Limited

Teck C. Goh
Marine Processing Supervisor

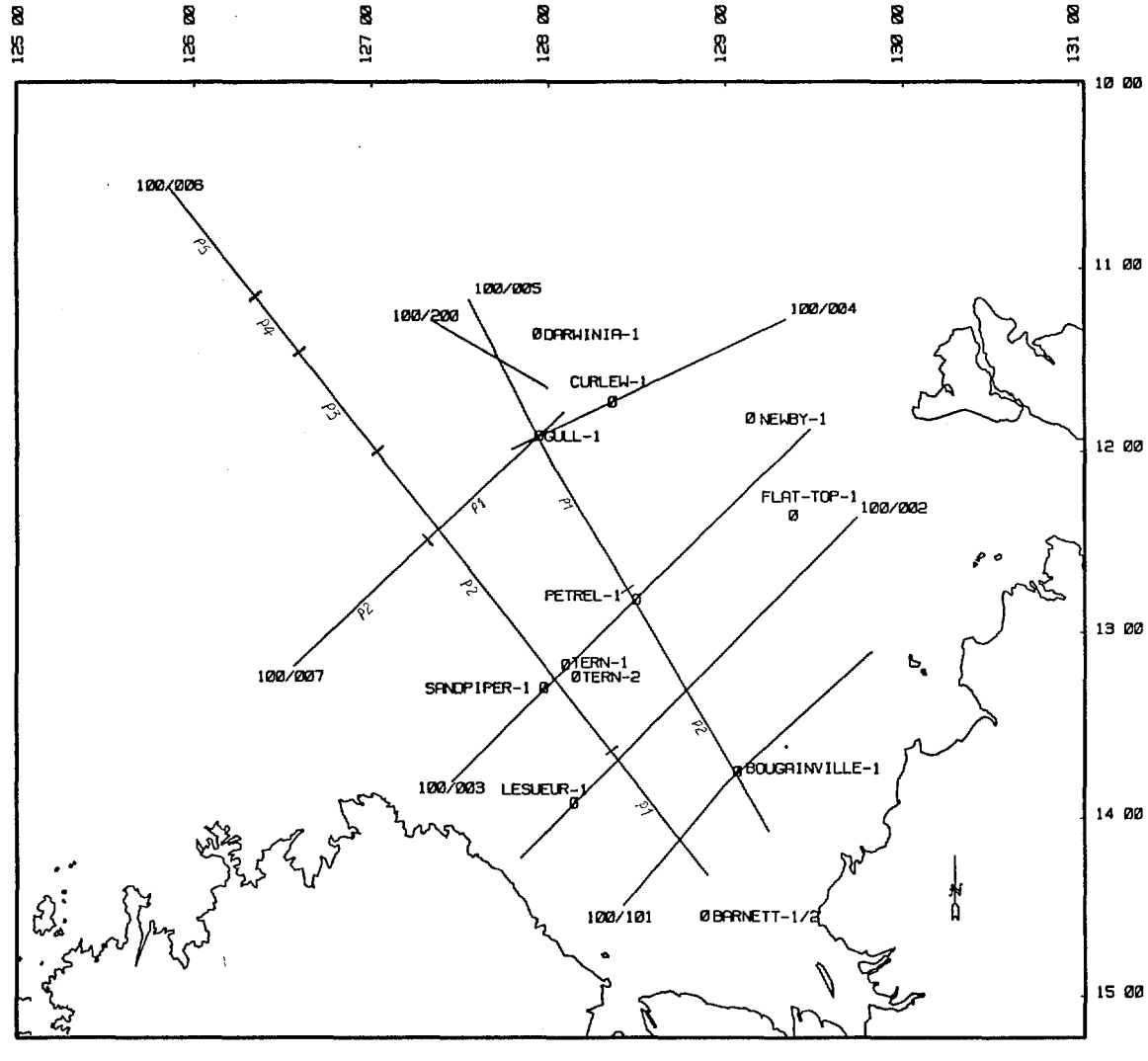
Dr. Nigel J. Fisher
Processing Manager

5.0 APPENDICES

5.1 Listing of line numbers with SPN ranges, kilometre indexes and TIME

	Line	SPN	Km	Time
1)	100/101	100	213.950	104.10.49.56
		4426		105.11.28.43
2)	100/002	100	264.500	102.11.43.12
		5437		103.19.28.29
3)	100/003	100	302.100	106.02.34.46
		6189		107.14.26.14
4)	100/004	100	183.550	108.00.35.06
		3818		108.22.02.28
5)	100/005	100	217.550	110.00.23.38
	(part 1)	4498		111.01.26.10
6)	100/005	100	162.750	111.07.38.27
	(part 2)	3401		112.01.38.39
7)	100/006	100	115.300	112.09.06.28
	(part 1)	2453		112.21.44.36
8)	100/006	100	246.650	117.01.08.11
	(part 2)	5080		118.04.59.16
9)	100/006	100	112.850	118.12.54.32
	(part 3)	2404		119.01.40.45
10)	100/006	100	25.200	119.06.42.15
	(part 4)	651		119.09.25.13
11)	100/006	100	65.000	119.15.09.52
	(part 5)	1447		119.22.17.01
12)	100/007	100	149.800	121.07.42.47
	(part 1)	3143		122.00.10.47
13)	100/007	100	75.650	122.04.49.04
	(part 2)	1660		122.13.51.05
14)	100/200	100	79.500	120.20.06.00
		1725		121.04.57.43

		Total	2214.350	



LOCATION MAP

BMR SURVEY 100

**----------

** DATA BASE TRANSMITTAL FORM

**

** SURVEY : 100 BONAPARTE 2

** DATA SET : SEGY RAW STACK

** MEDIA : 6250 BPI GCR, 9 TRACK TAPE

**

**PRODUCT ** CODE	LINE	START SPN	STOP SPN	START TIME	STOP TIME
M100S101T	100/101	100	4426	104.10:49	105.11:28
M100S002T	100/02	100	5437	102.11:43	103.19:28
M100S003T	100/03	100	6189	106.02:34	107.14:26
M100S004T	100/04	100	3818	108.00:35	108.22:02
M100S5P1T	100/05P1	100	4498	110.00:23	111.01:26
M100S5P2T	100/05P2	100	3401	111.07:38	112.01:38
M100S6P1T	100/06P1	100	2453	112.09:06	112.21:44
M100S6P2T	100/06P2	100	5080	117.01:08	118.04:59
M100S6P3T	100/06P3	100	2404	118.12:54	119.01:40
M100S6P4T	100/06P4	100	651	119.06:42	119.09:25
M100S6P5T	100/06P5	100	1447	119.15:09	119.22:17
M100S7P1T	100/07P1	100	3143	121.07:42	122.00:10
M100S7P2T	100/07P2	100	1660	122.04:49	122.13:51
M100S200T	100/200	100	1725	120.20:09	121.04:57

* END OF LIST : SEGY RAW STACK

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY    : 100      BONAPARTE 2
**      DATA SET  : SEGY MIGRATED STACK
**      MEDIA     : 6250 BPI GCR, 9 TRACK TAPE
**
**PRODUCT               LINE            START   STOP    START        STOP
** CODE                                  SPN     SPN     TIME         TIME
**-------------------------------------------------------------------------
M100Z101T              100/101         100     4426    104.10:49    105.11:28
M100Z002T              100/02          100     5437    102.11:43    103.19:28
M100Z003T              100/03          100     6189    106.02:34    107.14:26
M100Z004T              100/04          100     3818    108.00:35    108.22:02
M100Z5P1T              100/05P1        100     4498    110.00:23    111.01:26
M100Z5P2T              100/05P2        100     3401    111.07:38    112.01:38
M100Z6P1T              100/06P1        100     2453    112.09:06    112.21:44
M100Z6P2T              100/06P2        100     5080    117.01:08    118.04:59
M100Z6P3T              100/06P3        100     2404    118.12:54    119.01:40
M100Z6P4T              100/06P4        100      651    119.06:42    119.09:25
M100Z6P5T              100/06P5        100     1447    119.15:09    119.22:17
M100Z7P1T              100/07P1        100     3143    121.07:42    122.00:10
M100Z7P2T              100/07P2        100     1660    122.04:49    122.13:51
M100Z200T              100/200         100     1725    120.20:09    121.04:57
* END OF LIST : SEGY MIGRATED STACK
```

```
**-------------------------------------------------------------------------
**       DATA BASE TRANSMITTAL FORM
**
**       SURVEY    : 100      BONAPARTE 2
**       DATA SET  : DISCO V7 RAW STACK
**       MEDIA     : 6250 BPI GCR, 9 TRACK TAPE
**
**PRODUCT                LINE             START   STOP    START         STOP
** CODE                                    SPN     SPN     TIME          TIME
**-------------------------------------------------------------------------
M100S101T DISCO V7      100/101          100     4426    104.10:49     105.11:28
M100S002T DISCO V7      100/02           100     5437    102.11:43     103.19:28
M100S003T DISCO V7      100/03           100     6189    106.02:34     107.14:26
M100S004T DISCO V7      100/04           100     3818    108.00:35     108.22:02
M100S5P1T DISCO V7      100/05P1         100     4498    110.00:23     111.01:26
M100S5P2T DISCO V7      100/05P2         100     3401    111.07:38     112.01:38
M100S6P1T DISCO V7      100/06P1         100     2453    112.09:06     112.21:44
M100S6P2T DISCO V7      100/06P2         100     5080    117.01:08     118.04:59
M100S6P3T DISCO V7      100/06P3         100     2404    118.12:54     119.01:40
M100S6P4T DISCO V7      100/06P4         100      651    119.06:42     119.09:25
M100S6P5T DISCO V7      100/06P5         100     1447    119.15:09     119.22:17
M100S7P1T DISCO V7      100/07P1         100     3143    121.07:42     122.00:10
M100S7P2T DISCO V7      100/07P2         100     1660    122.04:49     122.13:51
M100S200T DISCO V7      100/200          100     1725    120.20:09     121.04:57
* END OF LIST : DISCO V7 RAW STACK
```

```
**-------------------------------------------------------------------------
**       DATA BASE TRANSMITTAL FORM
**
**       SURVEY    : 100      BONAPARTE 2
**       DATA SET  : DISCO V7 MIGRATED STACK
**       MEDIA     : 6250 BPI GCR, 9 TRACK TAPE
**
**PRODUCT                LINE             START   STOP    START         STOP
** CODE                                    SPN     SPN     TIME          TIME
**-------------------------------------------------------------------------
M100Z101T DISCO V7      100/101          100     4426    104.10:49     105.11:28
M100Z002T DISCO V7      100/02           100     5437    102.11:43     103.19:28
M100Z003T DISCO V7      100/03           100     6189    106.02:34     107.14:26
M100Z004T DISCO V7      100/04           100     3818    108.00:35     108.22:02
M100Z5P1T DISCO V7      100/05P1         100     4498    110.00:23     111.01:26
M100Z5P2T DISCO V7      100/05P2         100     3401    111.07:38     112.01:38
M100Z6P1T DISCO V7      100/06P1         100     2453    112.09:06     112.21:44
M100Z6P2T DISCO V7      100/06P2         100     5080    117.01:08     118.04:59
M100Z6P3T DISCO V7      100/06P3         100     2404    118.12:54     119.01:40
M100Z6P4T DISCO V7      100/06P4         100      651    119.06:42     119.09:25
M100Z6P5T DISCO V7      100/06P5         100     1447    119.15:09     119.22:17
M100Z7P6T DISCO V7      100/07P1         100     3143    121.07:42     122.00:10
M100Z7P7T DISCO V7      100/07P2         100     1660    122.04:49     122.13:51
M100Z200T DISCO V7      100/200          100     1725    120.20:09     121.04:57
* END OF LIST : DISCO V7 MIGRATED STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY   : 100     BONAPARTE 2
**      DATA SET : DISCO V7 SPEQ/TP STACK
**      MEDIA    : 6250 BPI GCR, 9 TRACK TAPE
**
**PRODUCT               LINE            START   STOP    START        STOP
** CODE                                  SPN     SPN     TIME         TIME
**-------------------------------------------------------------------------
M100V101T DISCO V7     100/101         100     4426    104.10:49    105.11:28
M100V002T DISCO V7     100/02          100     5437    102.11:43    103.19:28
M100V003T DISCO V7     100/03          100     6189    106.02:34    107.14:26
M100V004T DISCO V7     100/04          100     3818    108.00:35    108.22:02
M100V5P1T DISCO V7     100/05P1        100     4498    110.00:23    111.01:26
M100V5P2T DISCO V7     100/05P2        100     3401    111.07:38    112.01:38
M100V6P1T DISCO V7     100/06P1        100     2453    112.09:06    112.21:44
M100V6P2T DISCO V7     100/06P2        100     5080    117.01:08    118.04:59
M100V6P3T DISCO V7     100/06P3        100     2404    118.12:54    119.01:40
M100V6P4T DISCO V7     100/06P4        100      651    119.06:42    119.09:25
M100V6P5T DISCO V7     100/06P5        100     1447    119.15:09    119.22:17
M100V7P1T DISCO V7     100/07P1        100     3143    121.07:42    122.00:10
M100V7P2T DISCO V7     100/07P2        100     1660    122.04:49    122.13:51
M100V200T DISCO V7     100/200         100     1725    120.20:09    121.04:57
* END OF LIST : DISCO V7 SPEQ/TP STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**       SURVEY    : 100      BONAPARTE 2
**       DATA SET  : DISCO V7 SPEQ/TP MIGRATED STACK
**       MEDIA     : 6250 BPI GCR, 9 TRACK TAPE
**
**PRODUCT                LINE            START   STOP    START         STOP
** CODE                                   SPN     SPN     TIME          TIME
**-------------------------------------------------------------------------
M100Y101T DISCO V7      100/101         100     4426    104.10:49     105.11:28
M100Y002T DISCO V7      100/02          100     5437    102.11:43     103.19:28
M100Y003T DISCO V7      100/03          100     6189    106.02:34     107.14:26
M100Y004T DISCO V7      100/04          100     3818    108.00:35     108.22:02
M100Y5P1T DISCO V7      100/05P1        100     4498    110.00:23     111.01:26
M100Y5P2T DISCO V7      100/05P2        100     3401    111.07:38     112.01:38
M100Y6P1T DISCO V7      100/06P1        100     2453    112.09:06     112.21:44
M100Y6P2T DISCO V7      100/06P2        100     5080    117.01:08     118.04:59
M100Y6P3T DISCO V7      100/06P3        100     2404    118.12:54     119.01:40
M100Y6P4T DISCO V7      100/06P4        100      651    119.06:42     119.09:25
M100Y6P5T DISCO V7      100/06P5        100     1447    119.15:09     119.22:17
M100Y7P1T DISCO V7      100/07P1        100     3143    121.07:42     122.00:10
M100Y7P2T DISCO V7      100/07P2        100     1660    122.04:49     122.13:51
M100Y200T DISCO V7      100/200         100     1725    120.20:09     121.04:57
* END OF LIST : DISCO V7 SPEQ/TP MIGRATED STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY   : 100     BONAPARTE 2
**      DATA SET : RAW STACK
**      MEDIA    : FILM
**
**PRODUCT               LINE            START   STOP    START        STOP
** CODE                                 SPN     SPN     TIME         TIME
**-------------------------------------------------------------------------
M100S101F 1/3          100/101         100             104.10:49
M100S101F 2/3          100/101
M100S101F 3/3          100/101                 4426                 105.11:28

M100S002F 1/3          100/02          100             102.11:43
M100S002F 2/3          100/02
M100S002F 3/3          100/02                  5437                 103.19:28

M100S003F 1/3          100/03          100             106.02:34
M100S003F 2/3          100/03
M100S003F 3/3          100/03                  6189                 107.14:26

M100S004F 1/2          100/04          100             108.00:35
M100S004F 2/2          100/04                  3818                 108.22:02

M100S5P1F 1/3          100/05P1        100             110.00:23
M100S5P1F 2/3          100/05P1
M100S5P1F 3/3          100/05P1                4498                 111.01:26

M100S5P2F 1/2          100/05P2        100             111.07:38
M100S5P2F 2/2          100/05P2                3401                 112.01:38

M100S6P1F 1/2          100/06P1        100             112.09:06
M100S6P1F 2/2          100/06P1                2453                 112.21:44

M100S6P2F 1/3          100/06P2        100             117.01:08
M100S6P2F 2/3          100/06P2
M100S6P2F 3/3          100/06P2                5080                 118.04:59

M100S6P3F 1/2          100/06P3        100             118.12:54
M100S6P3F 2/2          100/06P3                2404                 119.01:40

M100S6P4F 1/1          100/06P4        100      651    119.06:42    119.09:25

M100S6P5F 1/1          100/06P5        100     1447    119.15:09    119.22:17

M100S7P1F 1/2          100/07P1        100             121.07:42
M100S7P1F 2/2          100/07P1                3143                 122.00:10

M100S7P2F 1/1          100/07P2        100     1660    122.04:49    122.13:51

M100S200F 1/1          100/200         100     1725    120.20:09    121.04:57
* END OF LIST : RAW STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY    : 100     BONAPARTE 2
**      DATA SET  : COMPRESSED RAW STACK
**      MEDIA     : FILM
**
**PRODUCT                LINE            START   STOP    START         STOP
** CODE                                   SPN     SPN     TIME          TIME
**-------------------------------------------------------------------------
M100C101F 1/2           100/101         100             104.10:49
M100C101F 2/2           100/101                 4426                  105.11:28

M100C002F 1/2           100/02          100             102.11:43
M100C002F 2/2           100/02                  5437                  103.19:28

M100C003F 1/2           100/03          100             106.02:34
M100C003F 2/2           100/03                  6189                  107.14:26

M100C004F 1/1           100/04          100     3818    108.00:35     108.22:02

M100C5P1F 1/2           100/05P1        100             110.00:23
M100C5P1F 2/2           100/05P1                4498                  111.01:26

M100C5P2F 1/1           100/05P2        100     3401    111.07:38     112.01:38

M100C6P1F 1/1           100/06P1        100     2453    112.09:06     112.21:44

M100C6P2F 1/2           100/06P2        100             117.01:08
M100C6P2F 2/2           100/06P2                5080                  118.04:59

M100C6P3F 1/1           100/06P3        100     2404    118.12:54     119.01:40

M100C6P4F 1/1           100/06P4        100      651    119.06:42     119.09:25

M100C6P5F 1/1           100/06P5        100     1447    119.15:09     119.22:17

M100C7P1F 1/1           100/07P1        100     3143    121.07:42     122.00:10

M100C7P2F 1/1           100/07P2        100     1660    122.04:49     122.13:51

M100C200F 1/1           100/200         100     1725    120.20:09     121.04:57
* END OF LIST : RAW STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY    : 100     BONAPARTE 2
**      DATA SET  : MIGRATED STACK
**      MEDIA     : FILM
**
**PRODUCT               LINE            START   STOP    START        STOP
** CODE                                  SPN     SPN     TIME         TIME
**-------------------------------------------------------------------------
M100Z101F 1/3          100/101         100             104.10:49
M100Z101F 2/3          100/101
M100Z101F 3/3          100/101                 4426                 105.11:28

M100Z002F 1/3          100/02          100             102.11:43
M100Z002F 2/3          100/02
M100Z002F 3/3          100/02                  5437                 103.19:28

M100Z003F 1/3          100/03          100             106.02:34
M100Z003F 2/3          100/03
M100Z003F 3/3          100/03                  6189                 107.14:26

M100Z004F 1/2          100/04          100             108.00:35
M100Z004F 2/2          100/04                  3818                 108.22:02

M100Z5P1F 1/3          100/05P1        100             110.00:23
M100Z5P1F 2/3          100/05P1
M100Z5P1F 3/3          100/05P1                4498                 111.01:26

M100Z5P2F 1/2          100/05P2        100             111.07:38
M100Z5P2F 2/2          100/05P2                3401                 112.01:38

M100Z6P1F 1/2          100/06P1        100             112.09:06
M100Z6P1F 2/2          100/06P1                2453                 112.21:44

M100Z6P2F 1/3          100/06P2        100             117.01:08
M100Z6P2F 2/3          100/06P2
M100Z6P2F 3/3          100/06P2                5080                 118.04:59

M100Z6P3F 1/1          100/06P3        100             118.12:54
M100Z6P3F 2/2          100/06P3                2404                 119.01:40

M100Z6P4F 1/1          100/06P4        100      651    119.06:42    119.09:25

M100Z6P5F 1/1          100/06P5        100     1447    119.15:09    119.22:17

M100Z7P1F 1/2          100/07P1        100             121.07:42
M100Z7P1F 2/2          100/07P1                3143                 122.00:10

M100Z7P2F 1/1          100/07P2        100     1660    122.04:49    122.13:51

M100Z200F 1/1          100/200         100     1725    120.20:09    121.04:57
* END OF LIST : MIGRATED STACK
```

```
**------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY    : 100     BONAPARTE 2
**      DATA SET  : COMPRESSED MIGRATED STACK
**      MEDIA     : FILM
**
**PRODUCT               LINE            START   STOP    START        STOP
** CODE                                  SPN     SPN     TIME         TIME
**------------------------------------------------------------------------
M100X101F 1/2          100/101         100             104.10:49
M100X101F 2/2          100/101                 4426                 105.11:28

M100X002F 1/2          100/02          100             102.11:43
M100X002F 2/2          100/02                  5437                 103.19:28

M100X003F 1/2          100/03          100             106.02:34
M100X003F 2/2          100/03                  6189                 107.14:26

M100X004F 1/1          100/04          100     3818    108.00:35    108.22:02

M100X5P1F 1/2          100/05P1        100             110.00:23
M100X5P1F 2/2          100/05P1                4498                 111.01:26

M100X5P2F 1/1          100/05P2        100     3401    111.07:38    112.01:38

M100X6P1F 1/1          100/06P1        100     2453    112.09:06    112.21:44

M100X6P2F 1/2          100/06P2        100             117.01:08
M100X6P2F 2/2          100/06P2                5080                 118.04:59

M100X6P3F 1/1          100/06P3        100     2404    118.12:54    119.01:40

M100X6P4F 1/1          100/06P4        100      651    119.06:42    119.09:25

M100X6P5F 1/1          100/06P5        100     1447    119.15:09    119.22:17

M100X7P1F 1/1          100/07P1        100     3143    121.07:42    122.00:10

M100X7P2F 1/1          100/07P2        100     1660    122.04:49    122.13:51

M100X200F 1/1          100/200         100     1725    120.20:09    121.04:57
* END OF LIST : COMPRESSED MIGRATED STACK
```

```
**------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY    : 100     BONAPARTE 2
**      DATA SET  : SPEQ/TP STACK
**      MEDIA     : FILM
**
**PRODUCT               LINE            START   STOP    START        STOP
** CODE                                  SPN     SPN     TIME         TIME
**------------------------------------------------------------------------
M100V101F 1/3          100/101         100             104.10:49
M100V101F 2/3          100/101
M100V101F 3/3          100/101                 4426                 105.11:28

M100V002F 1/3          100/02          100             102.11:43
M100V002F 2/3          100/02
M100V002F 3/3          100/02                  5437                 103.19:28

M100V003F 1/3          100/03          100             106.02:34
M100V003F 2/3          100/03
M100V003F 3/3          100/03                  6189                 107.14:26

M100V004F 1/2          100/04          100             108.00:35
M100V004F 2/2          100/04                  3818                 108.22:02

M100V5P1F 1/3          100/05P1        100             110.00:23
M100V5P1F 2/3          100/05P1
M100V5P1F 3/3          100/05P1                4498                 111.01:26

M100V5P2F 1/2          100/05P2        100             111.07:38
M100V5P2F 2/2          100/05P2                3401                 112.01:38

M100V6P1F 1/2          100/06P1        100             112.09:06
M100V6P1F 2/2          100/06P1                2453                 112.21:44

M100V6P2F 1/3          100/06P2        100             117.01:08
M100V6P2F 2/3          100/06P2
M100V6P2F 3/3          100/06P2                5080                 118.04:59

M100V6P3F 1/1          100/06P3        100             118.12:54
M100V6P3F 2/2          100/06P3                2404                 119.01:40

M100V6P4F 1/1          100/06P4        100      651    119.06:42    119.09:25

M100V6P5F 1/1          100/06P5        100     1447    119.15:09    119.22:17

M100V7P1F 1/2          100/07P1        100             121.07:42
M100V7P1F 2/2          100/07P1                3143                 122.00:10

M100V7P2F 1/1          100/07P2        100     1660    122.04:49    122.13:51

M100V200F 1/1          100/200         100     1725    120.20:09    121.04:57
* END OF LIST : SPEQ/TP STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**      SURVEY    : 100     BONAPARTE 2
**      DATA SET  : COMPRESSED SPEQ/TP STACK
**      MEDIA     : FILM
**
**PRODUCT               LINE            START   STOP    START        STOP
** CODE                                  SPN     SPN    TIME         TIME
**-------------------------------------------------------------------------
M100U101F 1/2          100/101         100             104.10:49
M100U101F 2/2          100/101                 4426                 105.11:28

M100U002F 1/2          100/02          100             102.11:43
M100U002F 2/2          100/02                  5437                 103.19:28

M100U003F 1/2          100/03          100             106.02:34
M100U003F 2/2          100/03                  6189                 107.14:26

M100U004F 1/1          100/04          100     3818    108.00:35    108.22:02

M100U5P1F 1/2          100/05P1        100             110.00:23
M100U5P1F 2/2          100/05P1                4498                 111.01:26

M100U5P2F 1/1          100/05P2        100     3401    111.07:38    112.01:38

M100U6P1F 1/1          100/06P1        100     2453    112.09:06    112.21:44

M100U6P2F 1/2          100/06P2        100             117.01:08
M100U6P2F 2/2          100/06P2                5080                 118.04:59

M100U6P3F 1/1          100/06P3        100     2404    118.12:54    119.01:40

M100U6P4F 1/1          100/06P4        100      651    119.06:42    119.09:25

M100U6P5F 1/1          100/06P5        100     1447    119.15:09    119.22:17

M100U7P1F 1/1          100/07P1        100     3143    121.07:42    122.00:10

M100U7P2F 1/1          100/07P2        100     1660    122.04:49    122.13:51

M100U200F 1/1          100/200         100     1725    120.20:09    121.04:57
* END OF LIST : COMPRESSED SPEQ/TP STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**       SURVEY    : 100      BONAPARTE 2
**       DATA SET  : SPEQ/TP MIGRATED STACK
**       MEDIA     : FILM
**
**PRODUCT                LINE             START   STOP     START        STOP
** CODE                                    SPN     SPN      TIME         TIME
**-------------------------------------------------------------------------
M100Y101F 1/3           100/101          100              104.10:49
M100Y101F 2/3           100/101
M100Y101F 3/3           100/101                  4426                  105.11:28

M100Y002F 1/3           100/02           100              102.11:43
M100Y002F 2/3           100/02
M100Y002F 3/3           100/02                   5437                  103.19:28

M100Y003F 1/3           100/03           100              106.02:34
M100Y003F 2/3           100/03
M100Y003F 3/3           100/03                   6189                  107.14:26

M100Y004F 1/2           100/04           100              108.00:35
M100Y004F 2/2           100/04                   3818                  108.22:02

M100Y5P1F 1/3           100/05P1         100              110.00:23
M100Y5P1F 2/3           100/05P1
M100Y5P1F 3/3           100/05P1                 4498                  111.01:26

M100Y5P2F 1/2           100/05P2         100              111.07:38
M100Y5P2F 2/2           100/05P2                 3401                  112.01:38

M100Y6P1F 1/2           100/06P1         100              112.09:06
M100Y6P1F 2/2           100/06P1                 2453                  112.21:44

M100Y6P2F 1/3           100/06P2         100              117.01:08
M100Y6P2F 2/3           100/06P2
M100Y6P2F 3/3           100/06P2                 5080                  118.04:59

M100Y6P3F 1/1           100/06P3         100              118.12:54
M100Y6P3F 2/2           100/06P3                 2404                  119.01:40

M100Y6P4F 1/1           100/06P4         100      651     119.06:42    119.09:25

M100Y6P5F 1/1           100/06P5         100     1447     119.15:09    119.22:17

M100Y7P1F 1/2           100/07P1         100              121.07:42
M100Y7P1F 2/2           100/07P1                 3143                  122.00:10

M100Y7P2F 1/1           100/07P2         100     1660     122.04:49    122.13:51

M100Y200F 1/1           100/200          100     1725     120.20:09    121.04:57
* END OF LIST : SPEQ/TP MIGRATED STACK
```

```
**-------------------------------------------------------------------------
**      DATA BASE TRANSMITTAL FORM
**
**       SURVEY    : 100      BONAPARTE 2
**       DATA SET  : COMPRESSED SPEQ/TP MIGRATED STACK
**       MEDIA     : FILM
**
**PRODUCT                LINE            START   STOP    START         STOP
** CODE                                   SPN     SPN     TIME          TIME
**-------------------------------------------------------------------------
M100W101F 1/2           100/101         100             104.10:49
M100W101F 2/2           100/101                 4426                  105.11:28

M100W002F 1/2           100/02          100             102.11:43
M100W002F 2/2           100/02                  5437                  103.19:28

M100W003F 1/2           100/03          100             106.02:34
M100W003F 2/2           100/03                  6189                  107.14:26

M100W004F 1/1           100/04          100     3818    108.00:35     108.22:02

M100W5P1F 1/2           100/05P1        100             110.00:23
M100W5P1F 2/2           100/05P1                4498                  111.01:26

M100W5P2F 1/1           100/05P2        100     3401    111.07:38     112.01:38

M100W6P1F 1/1           100/06P1        100     2453    112.09:06     112.21:44

M100W6P2F 1/2           100/06P2        100             117.01:08
M100W6P2F 2/2           100/06P2                5080                  118.04:59

M100W6P3F 1/1           100/06P3        100     2404    118.12:54     119.01:40

M100W6P4F 1/1           100/06P4        100      651    119.06:42     119.09:25

M100W6P5F 1/1           100/06P5        100     1447    119.15:09     119.22:17

M100W7P1F 1/1           100/07P1        100     3143    121.07:42     122.00:10

M100W7P2F 1/1           100/07P2        100     1660    122.04:49     122.13:51

M100W200F 1/1           100/200         100     1725    120.20:09     121.04:57
* END OF LIST : COMPRESSED SPEQ/TP MIGRATED STACK
```