CHAPTER 4
EFFECT OF SIBX DOSAGE LEVEL ON SINGLE-POINT BATCH FLOTATION

4.1 Introduction

The current practice at No 2 Gold Plant is to dose SIBX at a rate of 16g/t. The following experiments were conducted to establish the optimum dosage level of SIBX on gold, sulphur and uranium grades and recoveries. This information was needed so that chemicals could be compared in terms of rate and recovery data obtained from release curves. These curves would be generated with information obtained from batch flotation tests results that are to follow.

The materials and methods used are described in Chapter 3. Single-point batch flotation tests in which SIBX dosages were varied from 10 to 40g/t were performed at the plant operating flotation of pH 7.2. $CuSO_4.5H_2O$ was maintained at 70g/t, Dow 200 at 16g/t and GEMPOLYM GM4 at 20g/t. The concentrate was collected for 6 minutes. The results recorded are shown in Tables 4.1 to 4.4 and Figures 4.1 to 4.4. The standard error associated with each set of data is shown in the form of error bars in all the graphs that were plotted from the data.

4.2. Results and Discussion

4.2.1 Mass Recovery

Table 4.1 shows the mass recoveries recorded for each of the SIBX dosages tested. They increased from 10g/t to 30g/t SIBX, after there was a slight decrease at 40g/t. This trend is evident in Figure 4.1, which shows a plot of mass recovery against SIBX dosage. The initial trend can be attributed to more sulphide being floated by the increased amount of collector added. This is supported by variation in sulphur recovery with collector dosage (Figure 4.2 (b)).

Table 4.1 *Mass recovery*

SIBX *(g/t)*	Mass Recovery *(%)*	Standard Error
10	2.6	0.11
20	2.8	0.11
30	3.1	0.06
40	3.0	0.10

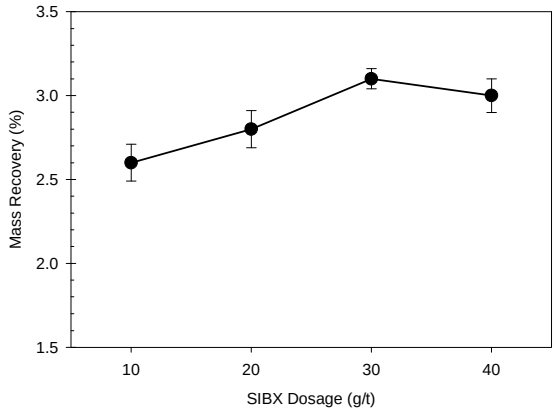

Figure 4.1 *Response of mass recovery to different SIBX dosages*

4.2.2 Sulphur

Table 4.2 shows sulphur recoveries and grades of concentrates and tailings obtained at each of the SIBX dosages tested. Sulphur grades decreased from 10g/t SIBX to 30g/t and then increased slightly at 40g/t (Figure 4.2 (a)). This is an opposite trend to mass recovery (Figure 4.1) and could be attributed to dilution from, presumably increased gangue flotation.

Table 4.2 *Sulphur flotation data for each SIBX dosage*

SIBX (g/t)	Concentrates		Tails		Sulphur Recovery (%)	Std Error
	Sulphur Grade (%)	Std Error	Sulphur Grade (%)	Std Error		
10	31.1	1.01	0.26	0.01	75.9	1.14
20	29.3	1.08	0.22	0.01	78.9	0.85
30	27.2	0.63	0.22	0.01	79.7	0.48
40	27.9	0.84	0.22	0.01	79.6	0.58

The grade of the tails did not vary significantly with TTC mole percent. Sulphur recoveries increased from 10g/t to 30g/t and almost levelled at 40g/t (Figure 4.2 (b)). The only significant change was between 10g/t and 20g/t. For the last three data points, sulphur recoveries were almost similar.

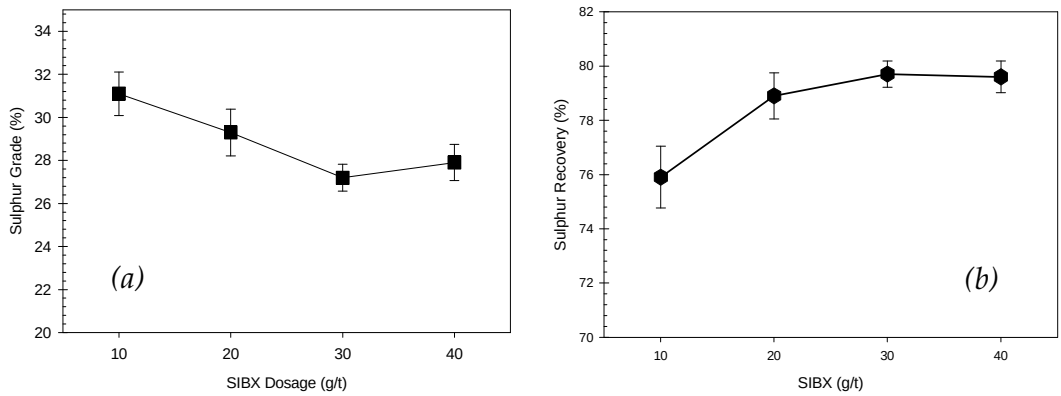

Figure 4.2 *Change of (a) concentrate sulphur grade and (b) the corresponding recoveries with SIBX dosage*

4.2.3 Uranium

Uranium recoveries, tailings and concentrate grades are shown in Table 4.3. A plot of uranium grade versus SIBX dosage in Figure 4.3 (a) shows a decrease from 10g/t SIBX to 30 g/t. This was followed by a slight increase at 40g/t. Taking into account experimental error, the latter may be insignificant. As for the recovery, the gradual increase from 10 to 40g/t SIBX is also small but there is a trend (Figure 4.3 (b)).

Table 4.3 *Uranium flotation responses for the SIBX concentrations tested*

SIBX *(g/t)*	Concentrates		Tails		Uranium Recovery (%)	Std Error
	Uranium *(ppm)*	Std Error	Uranium Grade *(ppm)*	Std Error		
10	888.3	65.5	140.0	1.4	14.2	0.6
20	884.0	71.5	141.7	2.3	15.2	0.9
30	796.3	16.1	140.7	6.0	15.3	0.6
40	813.3	3.5	136.3	4.0	15.7	0.8

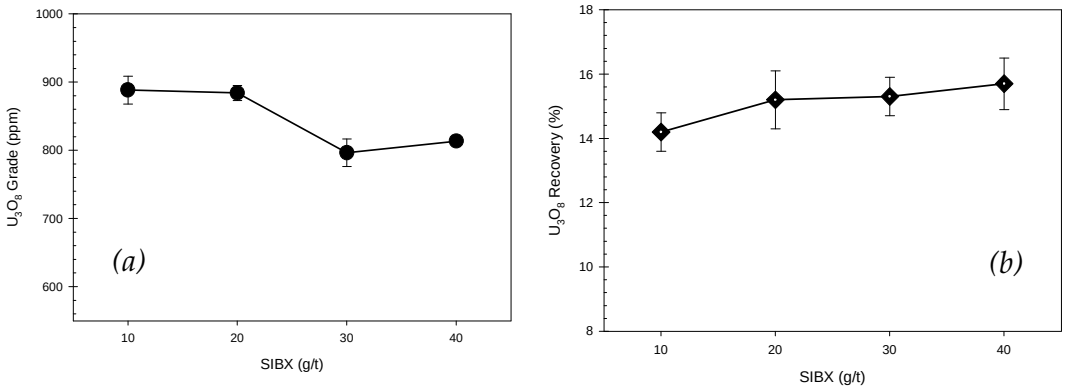

Figure 4.3 *Variation of (a) uranium grade (b) uranium recovery with SIBX*

4.2.4 Gold

Gold tailings and concentrate grades and recoveries are shown in Table 4.4. Statistically, gold grade was not affected by SIBX dosage (Figure 4.4(a)). However recovery (Figure 4.4 (b)) increased steadily from 10g/t to 40g/t collector and the tails showed the correspondence. With experimental error

taken into account, the differences in these responses become small, leading to the conclusion that gold recoveries and grades varied marginally, but again, there is a trend.

Table 4.4 *Gold flotation data for each SIBX dosage tested*

SIBX (g/t)	Concentrates		Tails		Gold Recovery (%)	Std Error
	Gold Grade (g/t)	Std Error	Gold Grade (g/t)	Std Error		
10	5.4	0.3	0.26	0.02	35.0	1.2
20	5.2	0.1	0.23	0.01	39.5	3.8
30	5.8	0.6	0.25	0.03	40.8	1.9
40	5.3	0.1	0.22	0.01	43.1	3.6

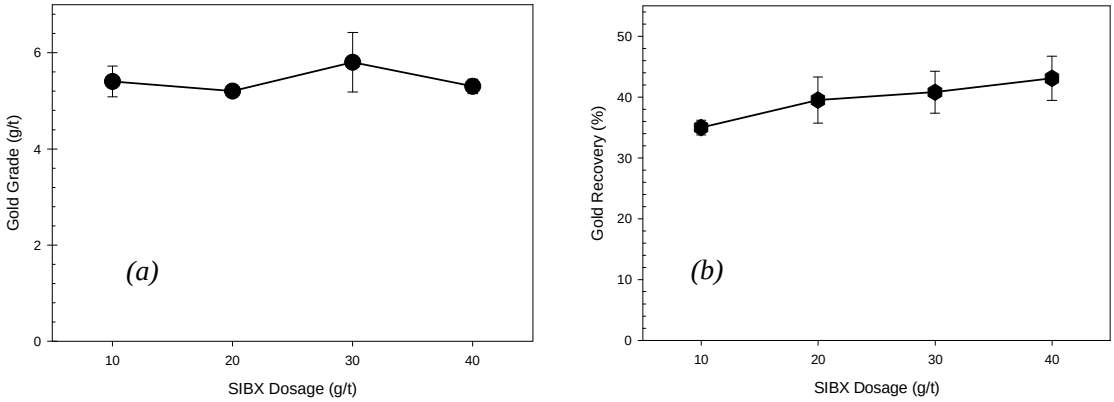

Figure 4.4 *Variation of (a) gold grade and (b) gold recovery with SIBX dosage*

4.2.5 Optimum SIBX Dosage

Figure 4.5 shows the recoveries and grades of all three minerals plotted on the same axis. In order to stay close to plant operating conditions, a level of 20g/t SIBX was selected.

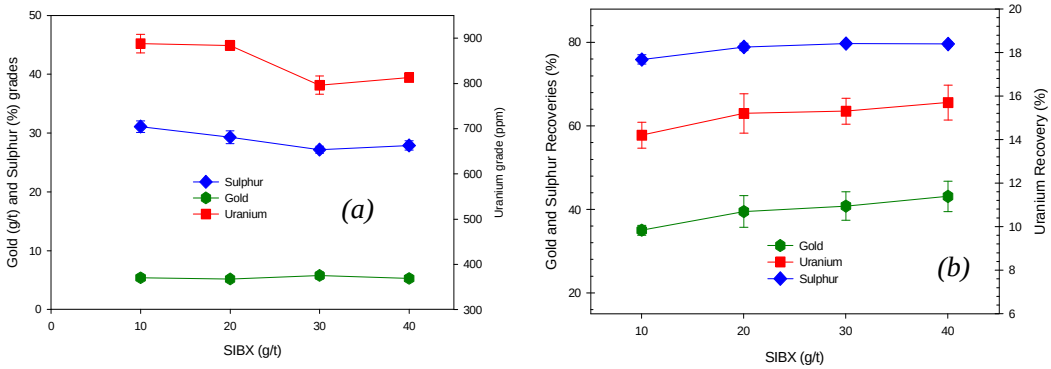

Figure 4.5 *(a) sulphur, gold and uranium grades and (b) their corresponding recoveries plotted versus SIBX*

4.2.6 Conclusions:

A steady increase in sulphur, uranium and gold recovery was found in SIBX doses from 10g/t to 40g/t. The gold grade seemed unaffected by dosage between the limits described.